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Advanced Program Development Management Software System

Final Report Software Description & User's Manual

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Foreword

This document was prepared by SRS Technologies under Contract NAS8-36643 for the Space Transportation and Exploration Office of NASA's George C. Marshall Space Flight Center. The work was performed under the supervision of the COTR, Mr. Bruce M. Wiegmann/PT.

This document is comprised of a comprehensive final report on Task One of the current amendment and includes under separate cover, a user's manual for the operation of the Interactive Office software system developed by SRS during the period from April 1, 1989 to March 31, 1990. Final Reports for other tasks of the current amendment are also bound separately. The SRS contract manager is Jay H. Laue of SRS Technologies' Systems Technology Group, Aerospace Systems Directorate in Huntsville, Alabama. The SRS Task leader is Terri H. Nabors. Other significant contributors at SRS included:

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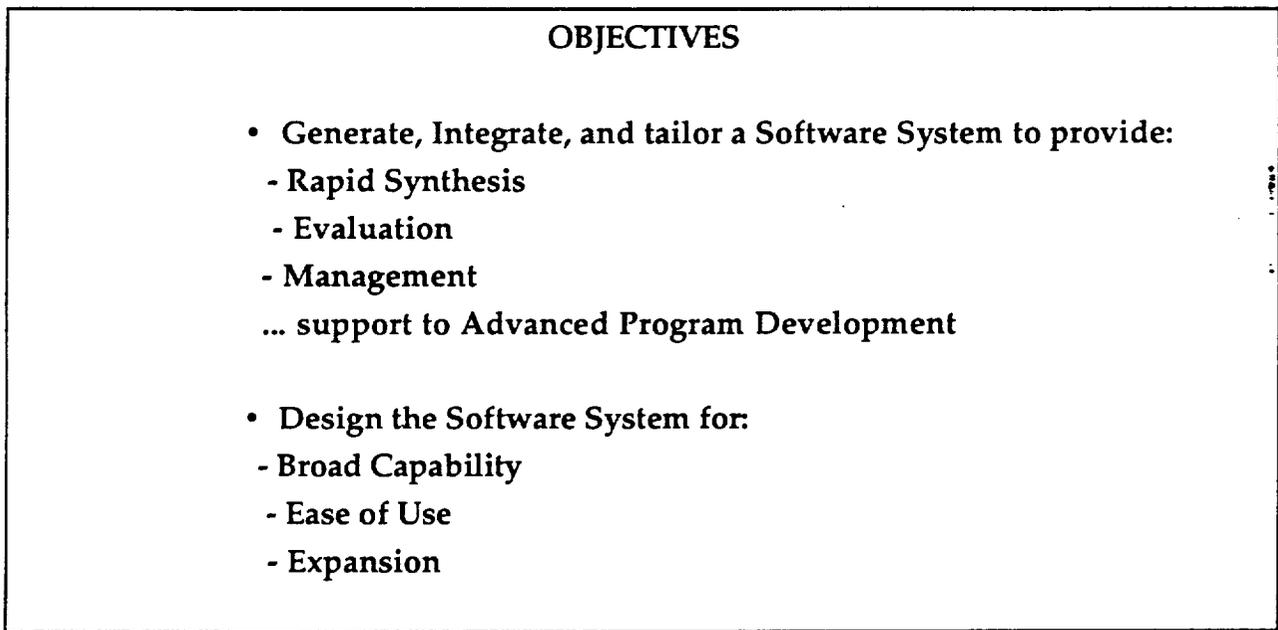
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1.0 INTRODUCTION

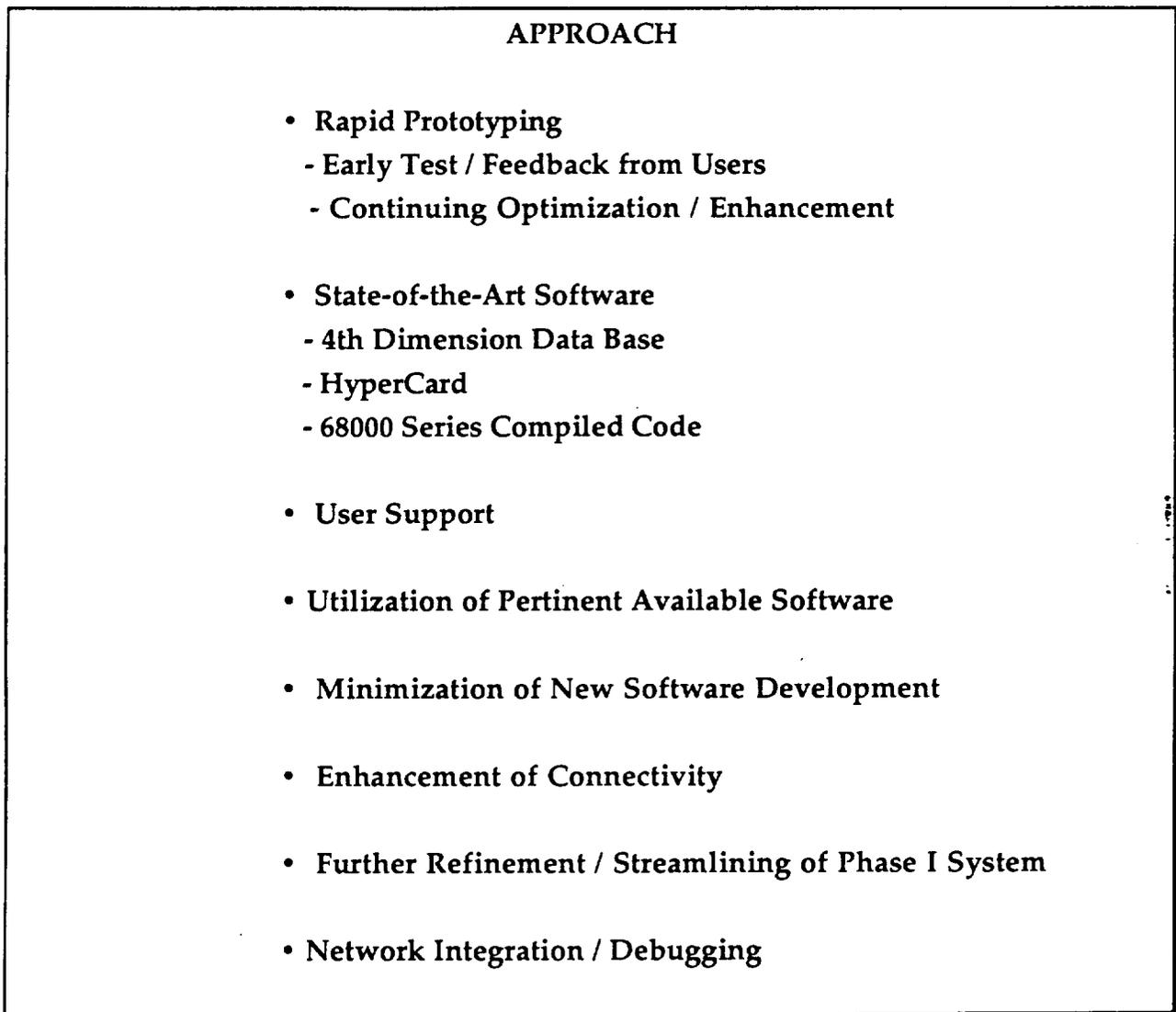
The objectives of this project indicated in Figure 1 were to apply emerging techniques and tools from the computer science discipline of paperless management to the activities of the Space Transportation and Exploration Office (PT01) in MSFC Program Development, thereby enhancing the productivity of the workforce, the quality of data products, and the collection, dissemination, and storage of information.

Figure 1. Objectives



The approach used to accomplish the objectives which are illustrated in Figure 2 emphasized the utilization of finished form (off-the-shelf) software products to the greatest extent possible without impacting the performance of the end product, to pursue developments when necessary in the rapid prototyping environment to provide a mechanism for frequent feedback from the users, and to provide a full range of user support functions during the development process to promote testing of the software.

Figure 2. Approach



Some conceptual study and development of paperless management tools had been performed in an earlier effort for MSFC and incorporated in a prototype software system called the Advanced Program Development Management Software System (APDMSS). This product and the lessons learned in its development formed the foundation from which the Interactive Office (IO) software was developed in this study. Figure 3 lists some of the priority enhancements required on the APDMS needed to achieve greater operability and more focused support to the rapid

synthesis, evaluation, and management of Manned Mars Mission program analysis and planning.

Figure 3. APDMS Enhancements Identified

SRS TECHNOLOGIES	Advanced Program Development Software System <i>Phase I / Priority Items</i>
<ul style="list-style-type: none">• Enhance Existing System Smoothness (Make It "Bullet Proof")• Establish Automated Linkage Between HyperCard and 4-D• Provide for Additional Management Layers in Tracking System• Post Calendar Messages to 4-D Projects (Keep Track of Notes)• Expand Calendar Functions to External World• Install Electronic Mail Program on AppleShare Network• Install Additional SCSI Devices on Network (CD-ROM, 140 Mb Drive)	

The items above were presented and discussed at the kick-off meeting. At the conclusion of the meeting, a consensus was reached with the COTR to concentrate on the first, third, fifth and sixth items. An interpretation on enhancing system smoothness was established which focused on debugging common operational errors, but stopped short of intensive end-to-end fault tolerance. The existing manual linkage between IO and HyperCard was proven sufficient and that item was deferred. Three developments to support user definable organization layers were implemented during the course of this project. A function to capture notes about projects was implemented through dialog boxes and associated with the reminder function.

Expansion of the calendar function to the external world focused on two areas. First, expansion of the link between the PT01 organization and personnel in the Program Planning Office (PP) and to the Program Development Executive Management Assistant was targeted. The lack of a physical link between the PT01 Apple Network and PP along with some rearrangement of office spaces prevented the former expansion. However, Wayne Parks (PA01S) was connected to the IO fileserver and included in the electronic mail installation. The second area of expansion targeted was partial integration between the APDMS system and the existing Data General CEO software system. A request for specifications on CEO was made to the system support contractor, BCS. Unfortunately, due to the higher priority workload at BCS, they were not able to provide the information during the course of this project. A manual interface to the DG does exist, however, and is described later. In lieu of this effort, additional development work on other functions was performed. An electronic mail capability was installed in the form of the QuickMail product. Mailboxes and directories were established at MSFC for the PT01 organization, Code MD at NASA Headquarters, for PP01S at MSFC, and for a number of prime contractors of major on-going PT contracts. The expected acquisition of additional SCSI devices by PT did not occur. Therefore, the last item was unnecessary.

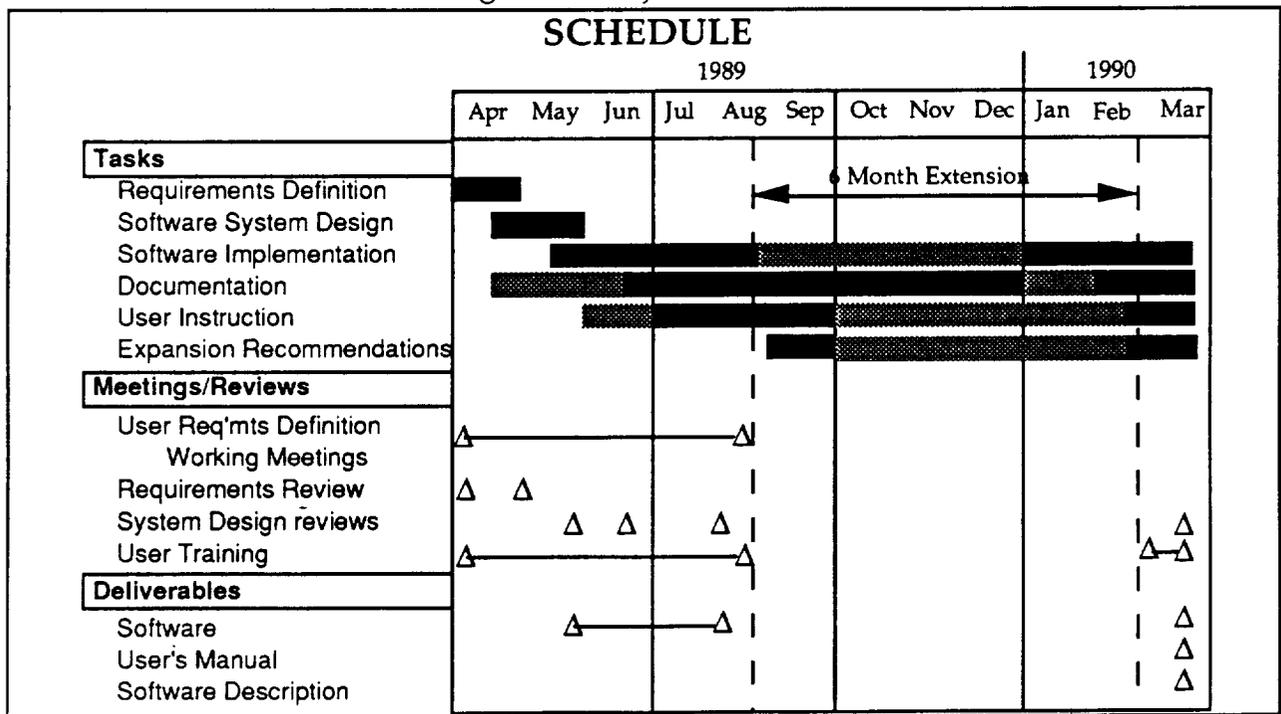
Some significant efforts were initiated during the study which were not foreseen at the kick-off. The most important of these being the original development of a standard forms management capability to convert the program planning/documentation process for the origination, review, and modification of a set of standard government printing office forms into a paperless electronic medium. The resulting product, MacRTOP, was later adopted by Code MD at Headquarters as the standard method for research and technology objectives and plans (RTOP) submittal from all NASA centers. It is now being developed further and maintained by Code MD under contract NASW-4341.

In addition, SRS presented a synopsis of the IO product to a group of managers and officer personnel from many other organizations within MSFC. Several are considering adopting IO for their own use. SRS also configured and maintained the IO file server during the course of this project.

2.0 PROJECT SCHEDULE

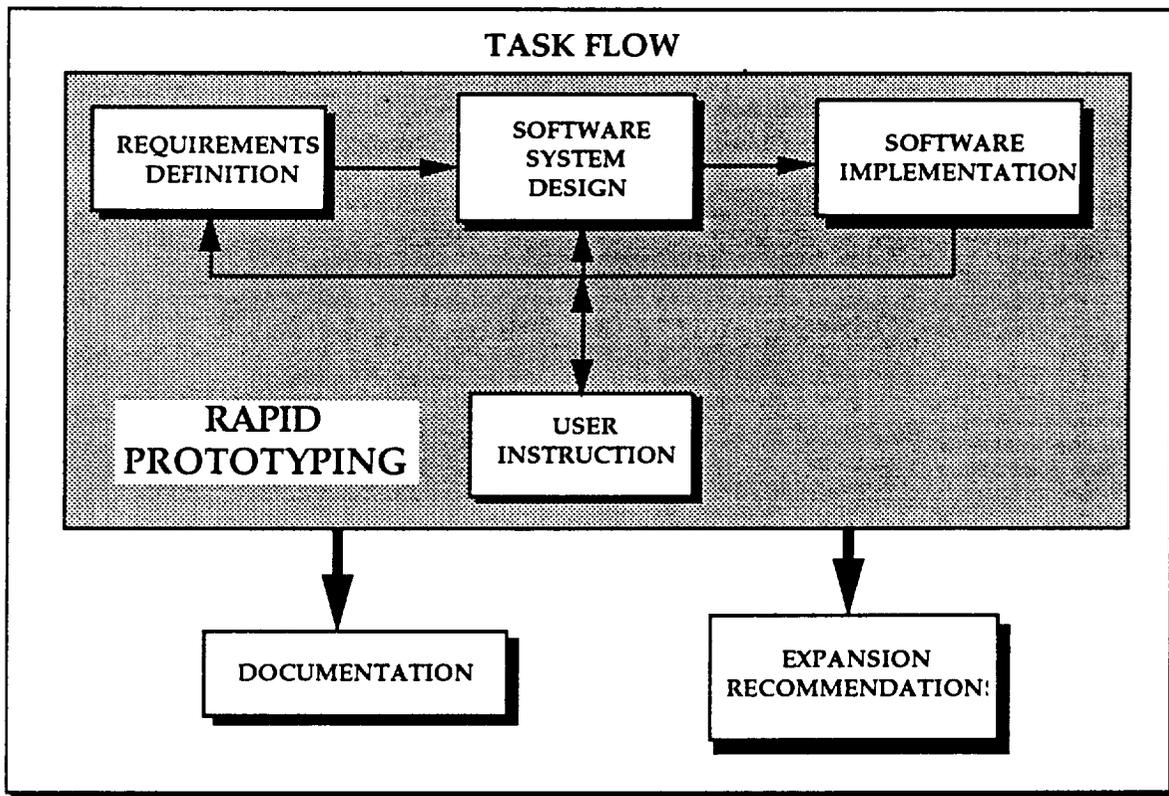
The Interactive Office was developed according to the schedule and milestones shown in Figure 4. A Task flow diagram for the project is depicted in Figure 5. IO task and subtask activities accomplished include Requirements Definition, Software System Design, Implementation, Documentation, User Instruction, and an assessment of future Expansion Requirements. These activities were initially scheduled to be performed within a period of 6 months from March 22, 1989 to September 22, 1989. However, the delivery of the final software and documentation were delayed at the request of the NASA COTR who was unexpectedly put on temporary high priority assignment with the Lunar/Mars Initiatives Working Group. This delay occurred in the fifth month of the project just weeks prior to completion. A low level of maintenance and documentation activity occurred during the ensuing 6 month period. The normal project schedule resumed in early March 1990.

Figure 4. Project Schedule



During the course of the study, a number of test, update, and deliver cycles occurred per the rapid prototyping process. These resulted in deliveries of IO versions in late May, mid June, and early August, 1989. Another, final version was delivered in mid March, 1990.

Figure 5. Project Task Flow



The flow of tasks in this project were dominated by the main prototyping feedback loop. The forward leg began with definition (or in the later cases refinement) of requirements for form and function of the software and hardware supporting IO. These requirements were established in numerous working meetings with the COTR and the beta test users of the Office of Space Transportation and Exploration both in one-on-one settings and in plenary sessions. The requirements were then transformed into a system design by the developers at SRS and included gathering of ancillary data as well as selection and specification of software and hardware products. Software implementation included the process of writing and debugging source code and graphical objects as well as installation and configuration at the user's workstations.

A primary feature needed in a paperless management tool is its user friendliness. It is important that paperless management tools minimize the time and effort required of the users to learn how to use the tools. Otherwise, the benefits over existing manual techniques are less apparent in the critical early stages of acceptance by the users of a new office tool. Therefore, the user instruction effort in this job was primarily accomplished by first, providing a product that requires almost no training, and second, by providing the users with telephone help services and frequent technical interchange meetings. In addition, the members of the SRS development team were each assigned designated users for whom they were responsible. Also, suggestion/problem forms were provided to the users.

Documentation was not included in the prototyping feedback in order to streamline the process and limit the burden on the users during the development process. This proved prudent during the course of the effort due to some major design fluctuations that occurred. On completion of the project, documentation was prepared (and is incorporated in this document) including a comprehensive report on the conduct and results of the project, a User's Guide for the Interactive Office Software, and a tutorial program to enhance future user support.

Chapter 4 of this document includes further expansion and enhancement recommendations for IO both to increase its operability and incorporate other areas of paperless management benefits.

3.0 TECHNICAL ACCOMPLISHMENTS

The IO product delivered was the result of parallel developments of a number of different capabilities which were then integrated into a single package. Development of some of the functions was accomplished along a direct path from requirements definition to design to coding, debugging, test, and documentation. Examples of these were the calendar function, electronic mail, and some standard forms.

However, development of a few of the functions/capabilities in IO required additional research and analyses in order to provide a good background knowledge base for design decisions or to derive secondary data needed to incorporate intelligent forecasting capabilities in the software. Examples include a brief study of the current state of the art in off-the-shelf software to support IO developments, the collection and analysis of historical data on the time required to accomplish tasks involved in different types of procurement processes used by NASA PD (which resulted in the forecasting capability of the Procurement Planner), and research into the methods used to calculate funding requirements displayed on RTOP forms.

The following sections describe the analytical processes and technical data associated with the development of each of the major IO capabilities/functions. They are:

- Requirements Definition and Design
- Software Selection
- Procurement Data Collection and Evaluation
- Calendar Function
- Procurement Planner
- Electronic Mail
- Standard Forms
- MacRTOP

Of the functions listed above, the Calendar Function and Procurement Planner can be found in embryonic form in the APDMSS.

3.1 IO REQUIREMENTS DEFINITION AND DESIGN

Rapid Prototyping was used in the development of IO. In this process, the development of the product (computer code in this case) begins as quickly as possible at the outset of the project. A formal requirements definition and the production of a set of specifications is avoided. Instead, early meetings with the COTR and a few of the primary users in PT01 were used as sessions where users voiced their desires. SRS then integrated these comments and produced rudimentary versions of IO which were quickly taken back to the users for comments. The almost constant feedback of the users during the development process guided the product to a more acceptable form than would have been possible in the standard system engineering development approach.

At some point in time it is necessary to withdraw from the rapid prototyping path to allow the developers to streamline, optimize, and complete the software before it can become a finished product. Early in the study, the COTR directed that this project should not attempt to finalize during its relatively short span, but should continue to evolve. As a result, debugging was performed as the users encountered problems with the prototype. No formal "bullet-proofing" of the software was scheduled.

The design of IO evolved during the course of the project. The central feature of IO is the calendar. The unavoidable homecard merely interfaced directly to the calendar, which then handled traffic between the daily schedule, leave/TDY tracking, the finder replacement, the reminder warning generator, the rolodex and the procurement planner. In the end all features were closely related to the homecard with the exception of MacRTOP and electronic mail. They were attached to IO through the general user-specifiable applications launchers in the Home card and through the ever present  menu.

The final requirements for IO included:

- A replacement for the Finder from which the user could launch a number of their most frequently used applications and data files from separate iconic "drawers",
- An office calendar which would display the current month with the current date highlighted. The ability to interact with the display to search dates forward and backward was also required,

- An indicator to display when office personnel were not in the office due to TDY or leave,

- A daily schedule for meetings and appointments which could contain items for the individual user, items for the subgroups (the branches of PT01) and items pertaining to the entire office.

- A schedule chart graphic-based element for scheduling procurement processing activities,

- A warning device that would alert users when procurement milestones were pending,

- An automated rolodex, and

- An electronic forms management utilities to reduce the materials and manpower required for organization, modification, tracking, archiving, and storage of standard NASA and Government Printing Office (GPO) forms data.

3.2 SOFTWARE SELECTION STUDY

An extensive survey of existing software products with potential to support or host IO developments was not necessary due to the availability of the results of similar activities performed in other NASA software development program and the currency of the SRS knowledge base in the state-of-the-art in computer software/hardware industry. SRS is a registered Software Product Developer with Apple Computer and Acius, Inc. through which SRS receives current update information on the Fourth Dimension Data Base program, and SRS is also registered as a Value-Added Reseller with CE Software, Inc., the producers of the QuickMail electronic mail package.

One of the first APDMSS project recommendations was the selection of AppleShare File server software to provide networking features within the PT01 Office. The features of AppleShare listed in Figure 6 provided an extension of capabilities over the existing basic Apple LocalTalk network. AppleShare was available off-the-shelf.

Figure 6. AppleShare Office Network Applicable Features

- DEDICATED CENTRAL FILESERVER SYSTEM (FOR Mac PLUS, SE, OR II)
- USES APPLE LOCALTALK NETWORK ARCHITECTURE
- DEVICE DRIVER ANALOGOUS TO A PRINTER DRIVER (EASY TO USE)
 - ACCESS TO NETWORK GAINED THROUGH CHOOSER DESK ACCESSORY
- ALLOWS DEFINITION OF "WORK GROUPS" ON THE NETWORK
 - EFFICIENT METHOD TO CHANNEL INFORMATION
 - AD-HOC WORK GROUPS ARE OBVIOUS WAY TO ORGANIZE DATA BY CONTROLLING DATA ACCESS PRIVILEGES
- PROVIDES MULTI-LEVEL SECURITY FEATURES
- IMMEDIATE SUPPORT OF MULTI-USER APPLICATIONS (4TH DIMENSION)
- PRODUCT LIST
 - FILE SERVER SOFTWARE (UP TO 25 NODES)
 - LASER SHARE PRINT SPOOLER
 - APPLESHARE PC (ADD-ON MS-DOS CARD)

As a backbone to IO, AppleShare greatly enhanced the possible capabilities that could be provided to the user. It also reduced the development effort required for certain functions and included additional non-IO functions useful to the users and upgraded the PT01 network to capture future growth/expansion capabilities. The latter proved fortuitous as the decision to integrate the local file server with the VAX-based AlisaShare software system was made at a later date. All developments and data were immediately transferable from AppleShare and may not have been with other alternatives.

Early in the project, IO was rehosted on the PT01 file server in IAN zone of the VAX System. Later, a Macintosh SE, then a Macintosh IICI were installed as local file servers named "IO Server" in the "MSFC 4200 4th Floor" zone and again IO was hosted on a local Apple computer. Network linkages were preserved to the Vax AlisaShare system and to the other zones through the MSFC computer network. AppleShare was upgraded from version 1.1 to version 2.0 to provide the improved capabilities listed below in Figure 7.

Figure 7. AppleShare Version Upgrade

	APPLESHARE NETWORK CURRENT CONFIGURATION
<p style="text-align: center;"><i>AppleShare 1.1 Capabilities</i></p> <ul style="list-style-type: none"> • Dedicated Central File Server System • Device Driver Analogous to a Printer Driver <ul style="list-style-type: none"> - Access to Network Gained Through Chooser Desk Accessory • Allows Definition of "Work-Groups" on the Network • Provides Multi-Level Security Features • Immediate Support of Multi-User Applications (4-D, Hyper Card) <p style="text-align: center;"><i>AppleShare 2.0 Capabilities</i></p> <ul style="list-style-type: none"> • Foreground Server Administration While Server is Active • User Control of Passwords • Folder Lock (Eliminates "Kidnapping") • Copy Protection Setting for Applications • "Super User" Option for Server Maintenance • CD-ROM Volume Support • Volume Copy • "Inter Poll" Administrative Utility Program • Advanced Laser Spooling 	

Early in the development, the need was identified for a centralized location of data from which each user's node would draw current, integrated information for input and display . The five off-the-shelf packages which met the initial screening criteria are shown in table 1. From these, Acius's 4th Dimension was chosen as the superior product for this application.

Table 1. Relational Database Product Comparisons

- BORLAND REFLEX PLUS
- ASHTON-TATE dBASE Mac
- ODESTA DOUBLE HELIX
- BLYTH OMNIS 3 PLUS
- ACIUS 4TH DIMENSION

Figure 8 summarizes the required features and different approaches considered for the calendar software. There existed at the time software was being selected for this project, a few off-the-shelf office automation software products which supported some of the required features (e.g. Focal Point, C.A.T., AEC Information Manager, CE Software's Calendar Maker) as well as data base programs and spreadsheets in general. Figures 9, 10, 11, and 12 illustrate the features of some these products. However, none of the available products fully met the basic needs. Shortcomings were often due to a lack of a critical function, a difference in nomenclature which was not modifiable, or indivisible bundling with too many extraneous features. SRS personnel had developed for their own use a customized calendar program which was also considered as a starting point for the IO calendar development, but it was too primitive and would have required more effort to modify than the approach finally chosen. The selected approach was to develop a new product utilizing the HyperCard development tools. HyperCard Scripts

provide developers with an environment which makes it relatively easy to create a powerful interface between the application software and the standard features of the Macintosh toolbox.

Figure 8. Calendar Software features and Alternate Approaches Considered

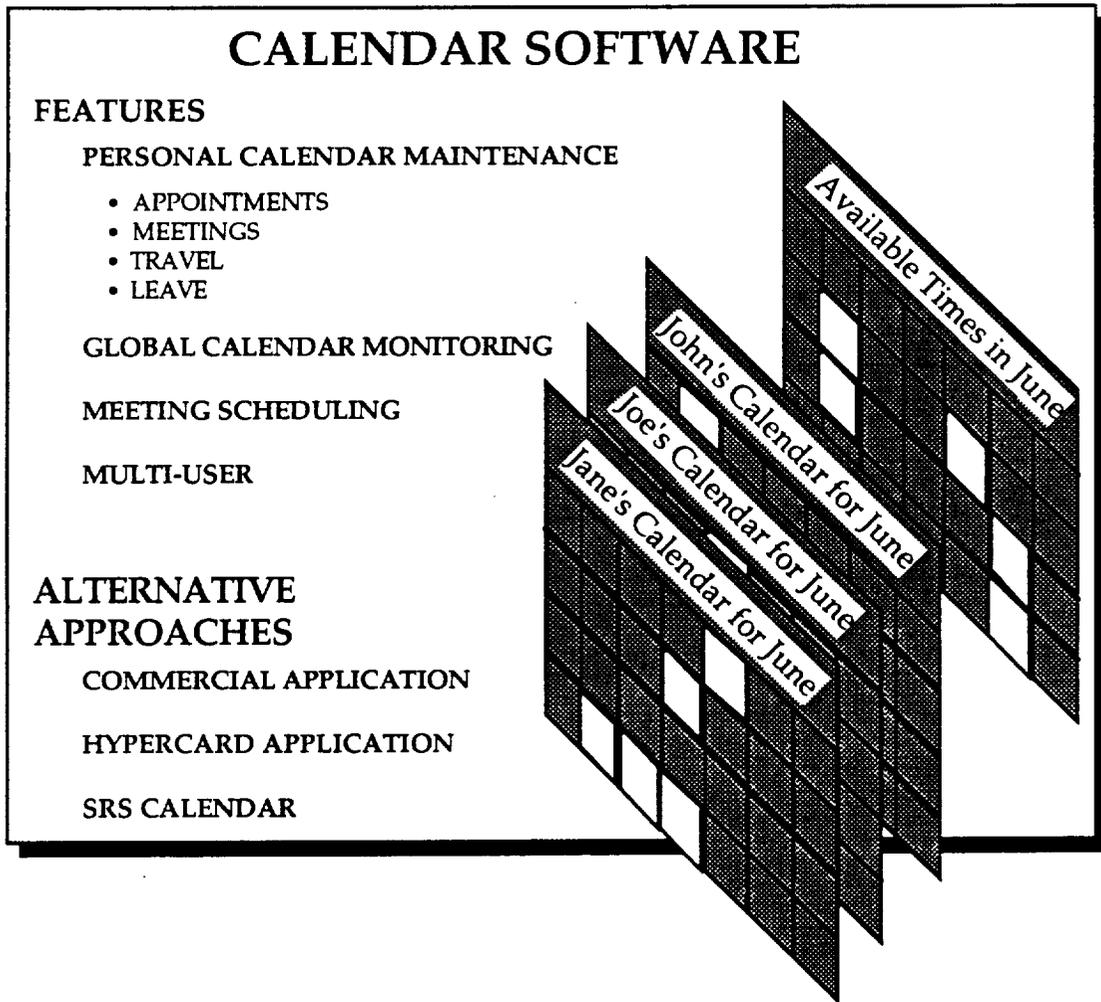


Figure 9. Focal Point Features

SRS <small>TECHNOLOGIES</small>	HYPERCARD FEATURES <i>(FOCAL POINT ORGANIZER STACK)</i>																		
<p>HyperCard is an "Information Environment" Used to Store, Create, Find and Peruse Large Amounts of Information at Exceptional Speeds.</p> <p>HyperCard Lends Itself to Third-Party Utility Development of Common Utility Programs (e.g. Focal Point - an Organizer Program).</p> <p>Focal Point is a System of Interconnected HyperCard Stacks that Allow Management of Business Information, Time, Projects, and Proposals.</p> <p style="text-align: center;"><i>Focal Point has 18 Predefined, Interrelated Stacks.</i></p> <table border="1" style="width: 100%;"> <tr> <td>• Daily Appointment Book</td> <td>• Time Sheets</td> <td>• Client Records</td> </tr> <tr> <td>• To Do List</td> <td>• Notes</td> <td>• Client Meeting Records</td> </tr> <tr> <td>• Monthly Calendar</td> <td>• Document Launcher</td> <td>• Vendor Records</td> </tr> <tr> <td>• Phone Directory and Dialer</td> <td>• Deadlines</td> <td>• Expense Reports</td> </tr> <tr> <td>• Outgoing Phone Log</td> <td>• Project Records</td> <td>• Auto Expense Reports</td> </tr> <tr> <td>• Incoming Phone Log</td> <td>• Proposals and Bids</td> <td>• Vendor Meeting Records</td> </tr> </table>		• Daily Appointment Book	• Time Sheets	• Client Records	• To Do List	• Notes	• Client Meeting Records	• Monthly Calendar	• Document Launcher	• Vendor Records	• Phone Directory and Dialer	• Deadlines	• Expense Reports	• Outgoing Phone Log	• Project Records	• Auto Expense Reports	• Incoming Phone Log	• Proposals and Bids	• Vendor Meeting Records
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• Monthly Calendar	• Document Launcher	• Vendor Records																	
• Phone Directory and Dialer	• Deadlines	• Expense Reports																	
• Outgoing Phone Log	• Project Records	• Auto Expense Reports																	
• Incoming Phone Log	• Proposals and Bids	• Vendor Meeting Records																	

Figure 10. 4th Dimension Database Features

SRS <small>TECHNOLOGIES</small>	4th DIMENSION RELATIONAL DATABASE	
<p>4th Dimension is a Fully Relational Database Management System Possessing Full Multi-User Capabilities</p> <p>4th Dimension is Best Described as an "Application Generator"</p> <p>4th Dimension Provides Customized Application Development Through A Powerful System of Programming Environments</p> <ul style="list-style-type: none"> • Design Environment for Creating Applications • User Environment for Testing Applications • Custom Environment for End-User Database Activity <p style="text-align: center;"><i>Advanced Features of 4th Dimension</i></p> <table border="1" style="width: 100%;"> <tr> <td> <ul style="list-style-type: none"> • Layout Design Using Object-Oriented Graphics • Share Data Among Multiple Users on a Network • Design Custom Menus, Buttons, and Dialog Boxes • Develop Custom Applications • Communicate Via Macintosh Serial Ports • Install Procedures Written in Other Languages </td> </tr> </table>		<ul style="list-style-type: none"> • Layout Design Using Object-Oriented Graphics • Share Data Among Multiple Users on a Network • Design Custom Menus, Buttons, and Dialog Boxes • Develop Custom Applications • Communicate Via Macintosh Serial Ports • Install Procedures Written in Other Languages
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Figure 11. Contacts•Activities•Time Features

SRS TECHNOLOGIES	C•A•T CONTACTS•ACTIVITIES•TIME
<p>C.A.T. is a Dedicated Relational Database Integrating Calendar, Text Processing and Activity Fields</p> <p>C.A.T. is Designed to Aid Executive Organizational Needs</p> <p style="text-align: center;"><i>Representative Features of C.A.T</i></p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"><ul style="list-style-type: none">• Multiple View of Contacts, Personalized by User• Preset Activities for Automatic Scheduling of Follow-Up Events• Preset Text for Form Letter Generation• Scripts and Form Entry• Calendar with Snapshot View of Events by Contacts, Activities and Time• Data Merging Feature to Allow Acquisition from Third Party Sources</div>	

Figure 12. MacProject II Features

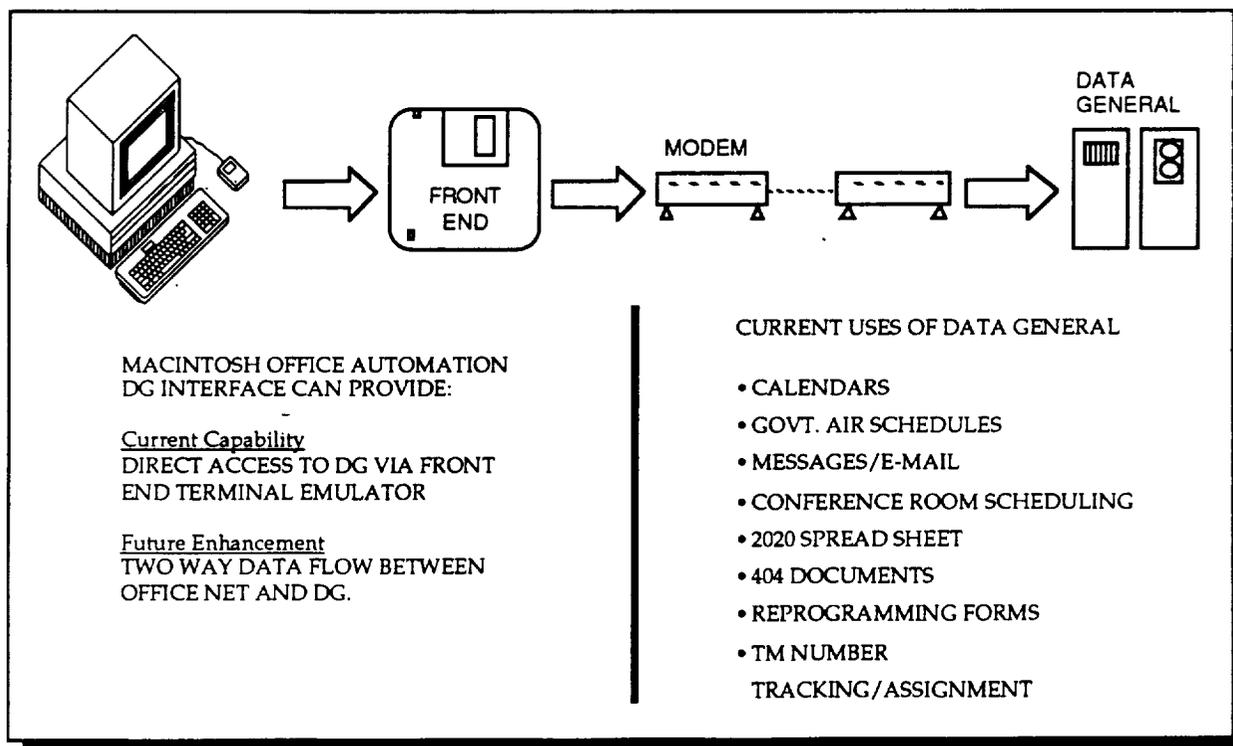
SRS TECHNOLOGIES	MACPROJECT II PROJECT SCHEDULING SOFTWARE
<p>MacProject II is a Professional-Level Project Management System</p> <p>Enables Users to Plan, Present, and Control Aspect of Intricate Projects</p> <p>Provides Graphical Project Layout Using Critical Path Techniques</p> <p style="text-align: center;"><i>Representative Features of MacProject II</i></p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"><ul style="list-style-type: none">• Hierarchical Subproject Consolidation• Display of Planned and Actual Status in Gantt and PERT Charts and Project Tables• Resource Histogram Generation• Ability to Evaluate Multiple Task Relationships• Custom Report Generation</div>	

The existing management information system at MSFC/PD, which runs on a Data General computer system contains a variety of useful information and functions for paperless management. It was, therefore, desirable to provide and interface between that system and the Macintosh-based IO software system to enable a more complete and powerful user environment.

The approach to integration was to achieve it in a three step process. The first step, which was well underway at MSFC at the beginning of the project was to use the two systems side-by-side, unconnected, in order to assess the strengths and weaknesses of each and identify the data and functions which would benefit most from integration. The most frequent observation of the users interviewed was the superior graphics and user interface requirements of the Macintosh preferred over the DG. The second most frequently stated desire was to have a single workstation at the desk rather than two disjointed terminals.

The second step resolved the later problem by utilizing an existing communications software package called "FRONT END", to configure the macintosh to execute in a terminal emulation mode in the DG system. This solution (illustrated in figure 13) had already been achieved at MSFC as well prior to the start of the project.

Figure 13. Data General Interface



IO was developed so that use of FRONT END would not be precluded. In the Applications section of the IO Home card, the hooks were installed to display an icon for and launch the FRONT END application as one of the user configurable common buttons.

A third step in which data is imported and exported between IO and DG system in a fashion invisible to the user was considered, but deferred to later programs in order to concentrate on other aspects of IO development. During the development of IO, a number of computer system/network improvements were in process at MSFC. The fluid nature of the configuration of hosting systems during this period would have made interface development difficult to implement or test conclusively. Instead, other areas of priority for IO features were pursued.

3.3 DATA COLLECTION & PREPARATION

It is widely recognized by managers throughout Government R&D organizations that the current procurement regulations and practices constitute one of the most significant burdens on the successful accomplishment of technical objectives. Therefore, a good deal of emphasis was placed on provided tools which could enhance office productivity in dealing with procurement activities. In order to provide a responsive system, it was necessary to understand the major milestones and activities associated with the range of procurement methods used.

Two kinds of activities associated with a competitive procurement mainstream and off-line. Mainstream activities are a set of critical path activities that occur nearly serially. They begin with preparation of documentation describing the products or services to be procured, followed by a number of review cycles, release of the request to industry and, finally, evaluation and selection of the contractor and final negotiations of the contract. A set of off-line activities occur in parallel to the mainstream activities. These include preparation of data requirements to be placed on the contractor, making necessary data available to offerers, news releases, and selection of proposal evaluators. Slack time is often available for these activities since the mainstream milestones are setting the critical path.

SRS met with Roger Romans of the program planning office in PD during the course of the project. Mr. Romans provided valuable data on the different types of procurements used by Program Development and historically derived data on the duration of time required to process a typical procurement type. The six types of procurements are:

- Full & Open Competitions (requires SEB for Phase B type contracts)
- Limited Competitions (requires SEB for Phase C/D type contracts)
- Full & Open Competitions (requires SEC within PD)
- Contract Modification/Change Order
- Sole Source Awards
- Unsolicited Proposals (including grants)

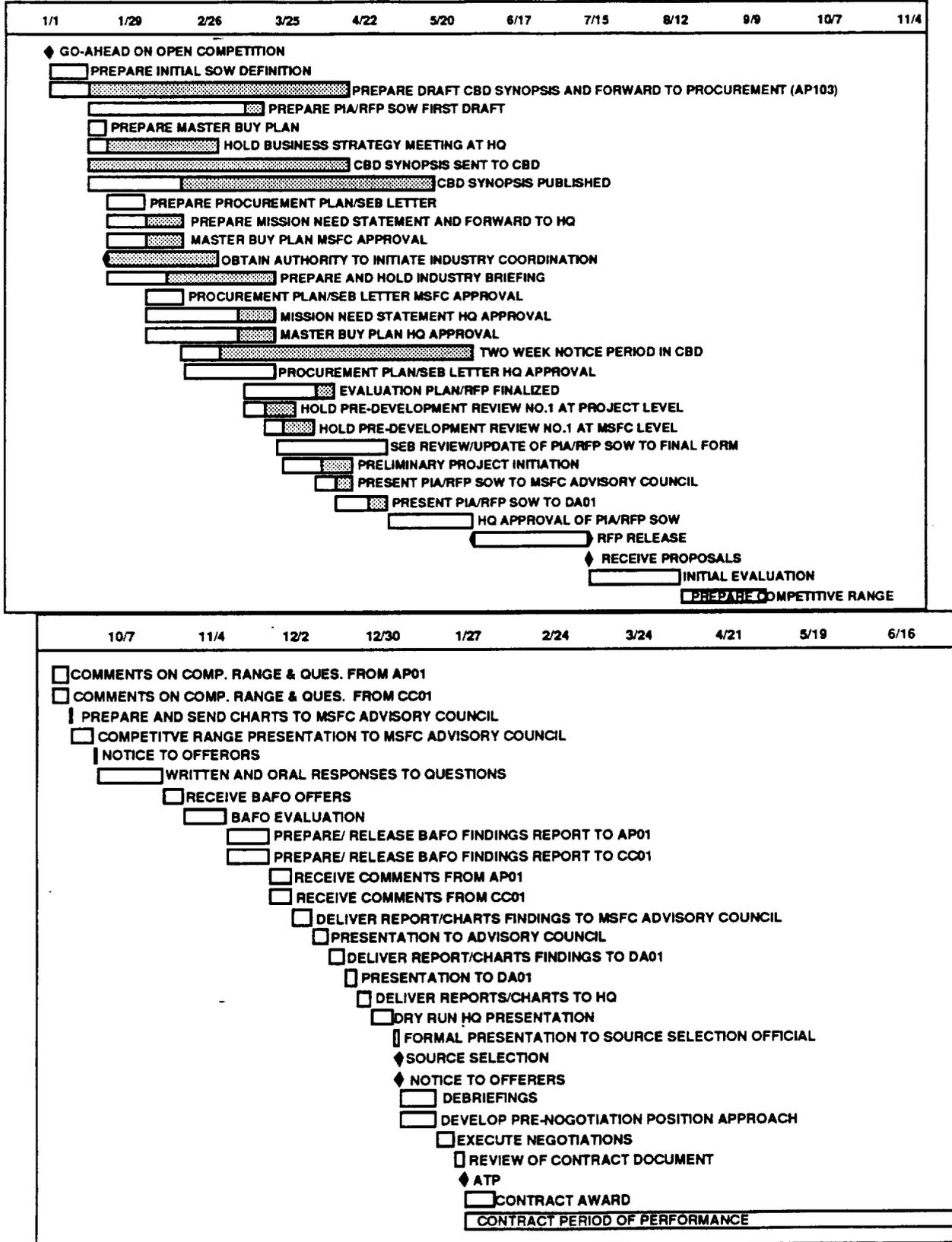
The shortest processing time required is on Unsolicited Proposals which includes Grants. These generally take less than three months. Contract modifications take only slightly more, and, including Sole source awards, these three types of procurement can be accomplished from start to ATP in less than six

months. The shortest processing time for a competitive procurement would be a full & open competition decided by a Source Selection Committee within PD rather than a full Source Evaluation Board. SEB competitions, Whether full and open or limited competition require over a year to process from initial go ahead on the competition to the start of paid contractor activities.

Since this portion of the study was performed, two new types of procurements have become popular, the National Research Announcement (NRA) and the Task Ordering Contract. Little historical data exists on these types. However, some task ordering type activity is currently going on and should build a experience base soon.

Having established these durations, it was then possible to construct features in IO which allowed managers to back-schedule from desired times to begin contractor technical work to the time the manger must begin the process of procuring out-of-house resources. Next, it is necessary to be more definitive in laying out to the user which specific activities were necessary. With the help of Mr. Romans, a detailed procurement processing schedule was prepared for each of the procurement types. The MacProject software package was used. Figure 14 illustrates a typical procurement timeline. Others are included in Appendix A.

Figure 14. MacProject Representation of a Typical Procure Processing Schedule



Diamonds represent milestones while the bars represent activities. The length of a bar extends from the earliest time it can be done to the latest time by which it must be accomplished. The actual time required to do the activity may be less than this duration. The white area of the bars represents the expected time to complete. The gray area represents slack available for the activity to slip around in without affecting the final completion date. Table 2 illustrates the start, end, and duration times in tabular form for each of the activities and milestones shown in the previous schedule.

Unfortunately, the number of activities and milestones is too numerous to be of any practical use to the manager in day to day activities. It was necessary to reduce the number of milestones down to a critical few which could be used by the manager to judge the progress of preparations for a procurement. Figure 15 shows the first attempt at reducing the number of milestones/activities. The six different types of procurement have slightly different activities. For instance, a sole source award does not include source evaluations and selections. Therefore names of activities were generalized so as to be applicable to all types and still fairly representative of the important milestones in each. However, even the selected number of activities was too small and a third list of only four milestones/ activities was identified: Statement of Work (SOW), Commitment of funds (COMMIT), Request for Proposals (RFP), and Authorization to Proceed (ATP). Figure 16. illustrates these and the expected time required in days for each segment in each of the six procurement types. These data were used in the construction of the procurement planner portion of IO.

Table 2. Typical Procurement Processing MacProject Project Table

Task Name	Days	Earliest		Latest	
		Start	Finish	Start	Finish
1 GO-AHEAD ON OPEN COMPETITION	0	1/1/88	1/1/88	1/1/88	1/1/88
2 PREPARE INITIAL SOW DEFINITION	10	1/1/88	1/15/88	1/1/88	1/15/88
3 PREPARE PIA/RFP SOW FIRST DRAFT	40	1/15/88	3/11/88	1/22/88	3/18/88
4 PREPARE MASTER BUY PLAN	5	1/15/88	1/22/88	1/15/88	1/22/88
5 HOLD BUSINESS STRATEGY MEETING AT HQ	5	1/15/88	1/22/88	2/24/88	3/2/88
6 PREPARE PROCUREMENT PLAN/SEB LETTER	10	1/22/88	2/5/88	1/22/88	2/5/88
7 EVALUATION PLAN/RFP FINALIZED	18	3/11/88	4/6/88	3/18/88	4/13/88
8 PREPARE DRAFT CBD SYNOPSIS AND FORWARD TO PROCUREMENT (AP103)	10	1/1/88	1/15/88	4/4/88	4/18/88
9 HOLD PRE-DEV REVIEW NO.1 AT PROJECT LEVEL	5	3/11/88	3/18/88	3/23/88	3/30/88
10 PREP MISSION NEED STATEMENT/SEND TO HQ	10	1/22/88	2/5/88	2/5/88	2/19/88
11 MASTER BUY PLAN MSFC APPROVAL	10	1/22/88	2/5/88	2/5/88	2/19/88
12 PROCUREMENT PLAN/SEB LETTER MSFC APPROVAL	10	2/5/88	2/19/88	2/5/88	2/19/88
13 CBD SYNOPSIS SENT TO CBD	0	1/15/88	1/15/88	4/18/88	4/18/88
14 OBTAIN AUTHORITY TO INITIATE INDUSTRY COORD	0	1/22/88	1/22/88	3/2/88	3/2/88
15 HOLD PRE-DEVELOP REVIEW NO.1 AT MSFC LEVEL	5	3/18/88	3/25/88	3/30/88	4/6/88
16 PRESENT PIA/RFP SOW TO MSFC ADVISORY COUNCIL	5	4/6/88	4/13/88	4/13/88	4/20/88
17 MISSION NEED STATEMENT HQ APPROVAL	23	2/5/88	3/9/88	2/19/88	3/23/88
18 PROCUREMENT PLAN/SEB LETTER HQ APPROVAL	23	2/19/88	3/23/88	2/19/88	3/23/88
19 MASTER BUY PLAN HQ APPROVAL	23	2/5/88	3/9/88	2/19/88	3/23/88
20 CBD SYNOPSIS PUBLISHED	23	1/15/88	2/17/88	4/18/88	5/19/88
21 PRELIMINARY PROJECT INITIATION	10	3/25/88	4/8/88	4/6/88	4/20/88
22 PREPARE AND HOLD INDUSTRY BRIEFING	15	1/22/88	2/12/88	3/2/88	3/23/88
23 PRESENT PIA/RFP SOW TO DA01	8	4/13/88	4/25/88	4/20/88	5/2/88
24 TWO WEEK NOTICE PERIOD IN CBD	10	2/17/88	3/2/88	5/19/88	6/2/88
25 SEB REVIEW/UPDATE OF PIA/RFP SOW TO FINAL FORM	28	3/23/88	5/2/88	3/23/88	5/2/88
26 HQ APPROVAL OF PIA/RFP SOW	23	5/2/88	6/2/88	5/2/88	6/2/88
27 RFP RELEASE	30	6/2/88	7/14/88	6/2/88	7/14/88
28 RECEIVE PROPOSALS	0	7/14/88	7/14/88	7/14/88	7/14/88
29 INITIAL EVALUATION	23	7/14/88	8/16/88	7/14/88	8/16/88
30 PREPARE COMPETITIVE RANGE & QUESTIONS	23	8/16/88	9/16/88	8/16/88	9/16/88
31 COMMENTS ON COMP. RANGE & QUES. FROM AP01	3	9/16/88	9/21/88	9/16/88	9/21/88
32 COMMENTS ON COMP. RANGE & QUES. FROM CC01	3	9/16/88	9/21/88	9/16/88	9/21/88
33 PREPARE AND SEND CHARTS TO MSFC ADV. COUNCIL	1	9/21/88	9/22/88	9/21/88	9/22/88
34 COMPETITIVE RANGE PRESENT TO MSFC ADV. COUNCIL	5	9/22/88	9/29/88	9/22/88	9/29/88
35 NOTICE TO OFFERORS	1	9/29/88	9/30/88	9/29/88	9/30/88
36 WRITTEN AND ORAL RESPONSES TO QUESTIONS	15	9/30/88	10/21/88	9/30/88	10/21/88
37 RECEIVE BAFO OFFERS	5	10/21/88	10/28/88	10/21/88	10/28/88
38 BAFO EVALUATION	10	10/28/88	11/11/88	10/28/88	11/11/88
39 PREPARE/ RELEASE BAFO FINDINGS REPORT TO AP01	10	11/11/88	11/25/88	11/11/88	11/25/88
40 PREPARE/ RELEASE BAFO FINDINGS REPORT TO CC01	10	11/11/88	11/25/88	11/11/88	11/25/88
41 RECEIVE COMMENTS FROM AP01	5	11/25/88	12/2/88	11/25/88	12/2/88
42 RECEIVE COMMENTS FROM CC01	5	11/25/88	12/2/88	11/25/88	12/2/88
43 DELIVER REPORT FINDINGS TO MSFC ADV. CO UNCIL	5	12/2/88	12/9/88	12/2/88	12/9/88
44 PRESENTATION TO ADVISORY COUNCIL	3	12/9/88	12/14/88	12/9/88	12/14/88
45 DELIVER REPORT/CHARTS FINDINGS TO DA01	3	12/14/88	12/19/88	12/14/88	12/19/88
46 PRESENTATION TO DA01	4	12/19/88	12/23/88	12/19/88	12/23/88
47 DELIVER REPORTS/CHARTS TO HQ	3	12/23/88	12/28/88	12/23/88	12/28/88
48 DRY RUN HQ PRESENTATION	5	12/28/88	1/4/89	12/28/88	1/4/89
49 FORMAL PRESENT TO SOURCE SELECTION OFFICIAL	2	1/4/89	1/6/89	1/4/89	1/6/89
50 SOURCE SELECTION	0	1/6/89	1/6/89	1/6/89	1/6/89
51 NOTICE TO OFFERERS	0	1/6/89	1/6/89	1/6/89	1/6/89
52 DEBRIEFINGS	8	1/6/89	1/18/89	1/6/89	1/18/89
53 DEVELOP PRE-NEGOTIATION POSITION APPROACH	8	1/6/89	1/18/89	1/6/89	1/18/89
54 EXECUTE NEGOTIATIONS	4	1/18/89	1/24/89	1/18/89	1/24/89
55 REVIEW OF CONTRACT DOCUMENT	3	1/24/89	1/27/89	1/24/89	1/27/89
56 ATP	0	1/27/89	1/27/89	1/27/89	1/27/89
57 CONTRACT AWARD	6	1/27/89	2/6/89	1/27/89	2/6/89
58 CONTRACT PERIOD OF PERFORMANCE	100	1/27/89	6/16/89	1/27/89	6/16/89

Figure 15. Procurement Planning Major and Minor Milestone Durations
(1st Reduction)

PROCUREMENT PLANNING MAJOR AND MINOR MILESTONE DURATIONS (DAYS REQUIRED BEFORE MILESTONE)		TYPE OF PROCUREMENT		o Unsolicited Proposal (includes Grants)	o Contract Modification/ Change Order	o Full & open competition (SEC within PD)	o Sole Source Award	o Limited Competition (Phase C/D SEB)	o Full & Open Competition (Phase B SEB)
		MAJOR	MINOR						
MILESTONES		MAJOR	MINOR						
BEGIN DRAFT DPD		X							
1ST DRAFT DPD COMPLETE		X							
COMMENTS REC'D TO 1ST DRAFT DPD		X							
2ND DRAFT DPD COMPLETE			X						
EVALUATION CRITERIA COMPLETE			X						
SYNOPSIS DRFT TO PP01			X						
PROP. PREP. INSTRUCTIONS COMPLETE			X						
EVALUATION FACTORS COMPLETE			X						
SEMIFINAL DRAFT DPD COMPLETE		X							
REF. DOCS DELIVERED TO REPOSITORY			X						
SYNOPSIS SENT TO CBD		X							
CBD SYNOPSIS PUBLISHED		X							
NEWS RELEASE PREPARED			X						
SEC APPOINTED			X						
RFP RELEASED		X							
1ST SEB/C MEETING (WT. FACTORS)			X						
PROPOSALS RECEIVED		X							
TECHNICAL EVALUATION COMPLETE		X							
GROUND RULES DOCUMENT PREPARED			X						
ATP ISSUED		X							
CONTRACT AWARD		X							

Figure 16. Procurement Planning Major and Minor Milestone Durations
(Last Reduction)

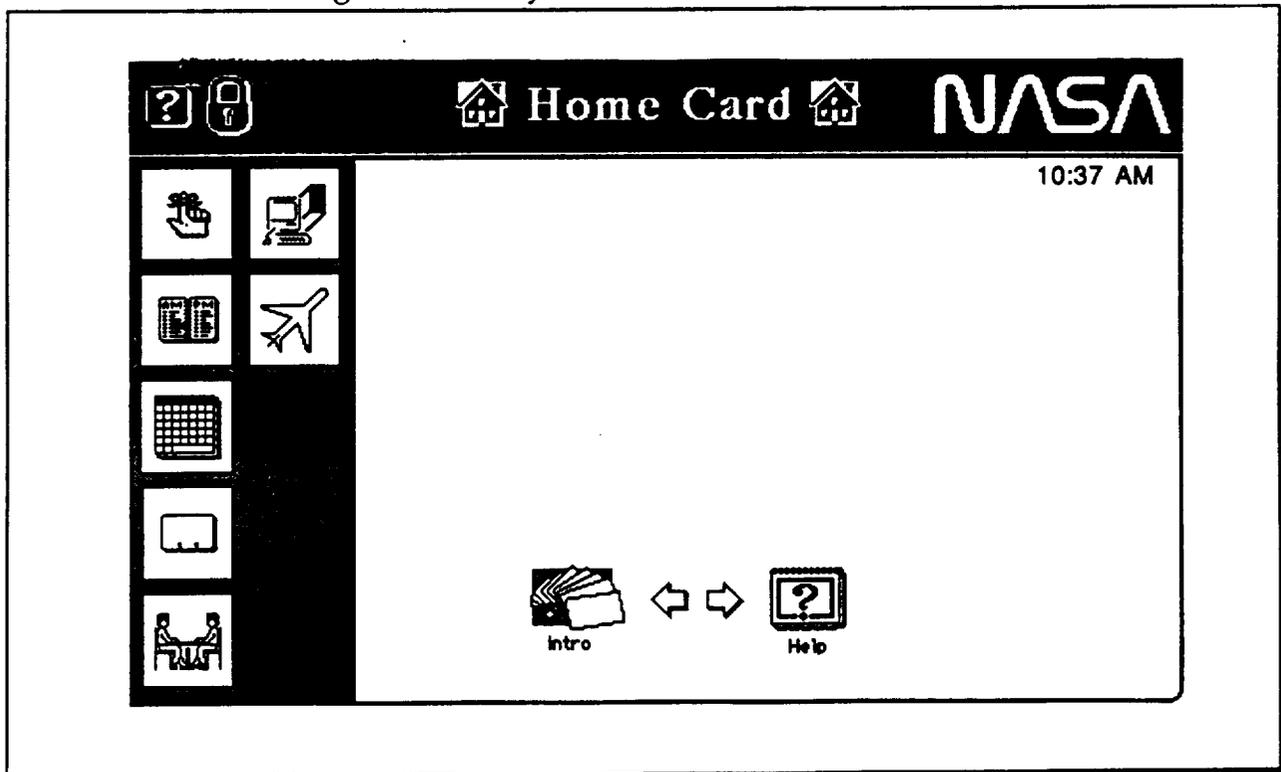
PROCUREMENT PLANNING MAJOR MILESTONE DURATIONS		TYPE OF PROCUREMENT		o Unsolicited Proposal (includes Grant)	o Contract Modification/ Change Order	o Full & Open Competition (SEC with PD)	o Sole Source Award	o Limited Competition (Phase C/D SEB)	o Full & Open Competition (Phase B SEB)
		ABBREVIATION	TIME BETWEEN MILESTONES (CALENDAR DAYS)						
MILESTONES		ABBREVIATION	TIME BETWEEN MILESTONES (CALENDAR DAYS)						
BEGIN SOW/CHANGE ORDER PREPARATION		SOW							
LETTER OF COMMITMENT TO PROCUREMENT		COMMIT	33	26	29	30	37	37	
RFP/CHANGE ORDER RELEASE		RFP	28	15	45	20	113	113	
AUTHORIZATION TO PROCEED		ATP	15	0	107	70	240	240	
		TOTAL	76	41	181	120	390	390	

3.4 THE IO HOME CARD

The IO Home card is the heart of the IO system. Written in HyperCard scripts it begins the user's involvement with IO every time the computer is booted. HyperCard was selected as the language for IO mainly because of its ability to interface at a high level with Macintosh system functions, its broad capability to make use of the standard Macintosh user graphical interfaces such as windows, buttons, and scroll bars, and HyperCard's relative ease of programming and maintenance. The most significant drawback to HyperCard is its speed of execution. The achievement of a full script compiler predicted by many experts in the industry did not occur. Some software was developed and released which allowed for partial compiling, but the most important functions remain dependant on source interpreters.

An early version of the homecard is depicted in Figure 17. Originally, the basic functions of the IO system were all to be available separately from this macro level through the row of buttons on the left. The five leftmost buttons launched the functions denoted by the icons, i.e., the reminder, daily schedule, calendar, rolodex,

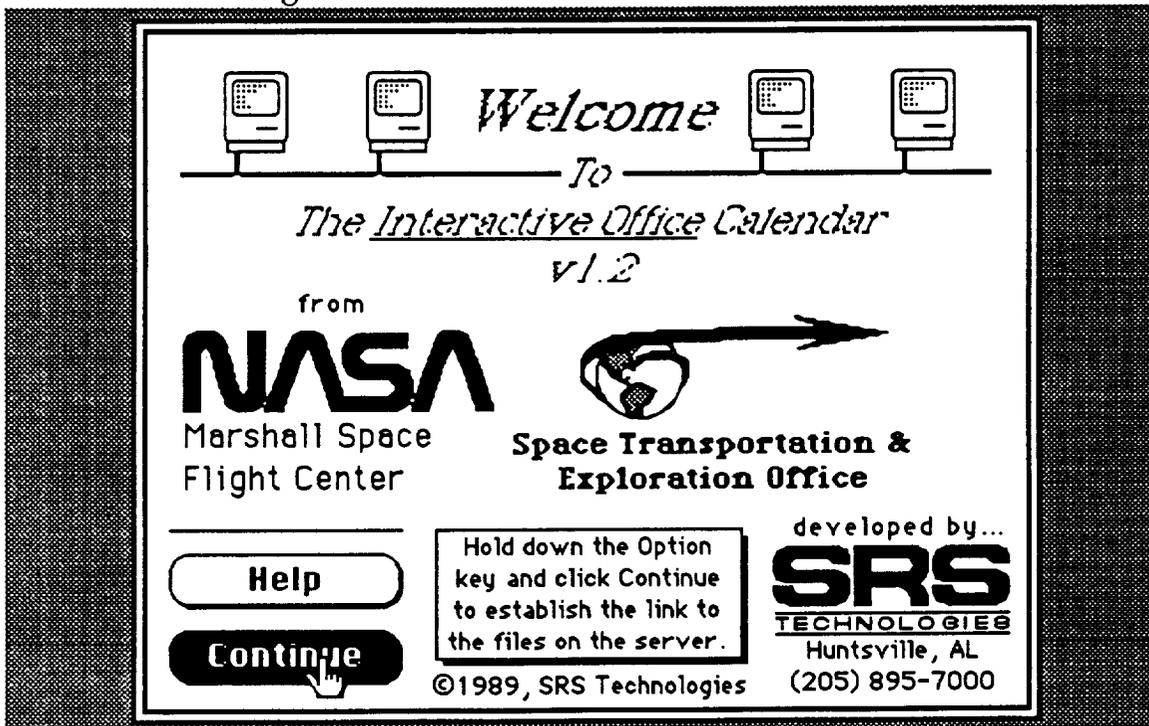
Figure 17. Early Version of the IO Home card



and meeting planner. The Macintosh button would send the user out of IO and back to the regular Apple desktop environment. The airplane icon scheduled travel. However, in testing, users became disgruntled at having to always mitigate through this card to get to the calendar (the most frequently used function) and then back to it to launch other functions. In an effort to make IO more "compact", these buttons were eventually located on the calendar card, making it the focus of user operations. HyperCard programming restrictions presented the complete deletion of the homecard. It was retained as mostly a bumper display of IO. Since users no longer navigated through it, it was seen less frequently and so became less offensive.

The finalized version of the homecard is illustrated in Figure 18 below. The Help button, when selected, displays a series of text summaries describing the features of IO and operating tips. "Continue" takes the user into the calendar screen discussed in the next section. For users who wished to disable IO and work at the normal Apple desktop level, they need only to "QUIT" HyperCard from the menus at the top of the screen.

Figure 18. Final Version of the IO Homecard



3.5 CALENDAR FUNCTION

This function underwent several metamorphoses during the project. The following is a discussion relating to how the calendar evolved. For a description of the final version of the calendar, refer to the IO User's Manual. Initially, the IO calendar was to have the look and feel of the deskpad-type calendar. The functionality of IO was to be accessed through a set of icon buttons in the perimeter dead-space of the card. In the end, the calendar still exists after the homecard, but it shares prominence with a number of other features.

Figure 19. Early Version of the Calendar

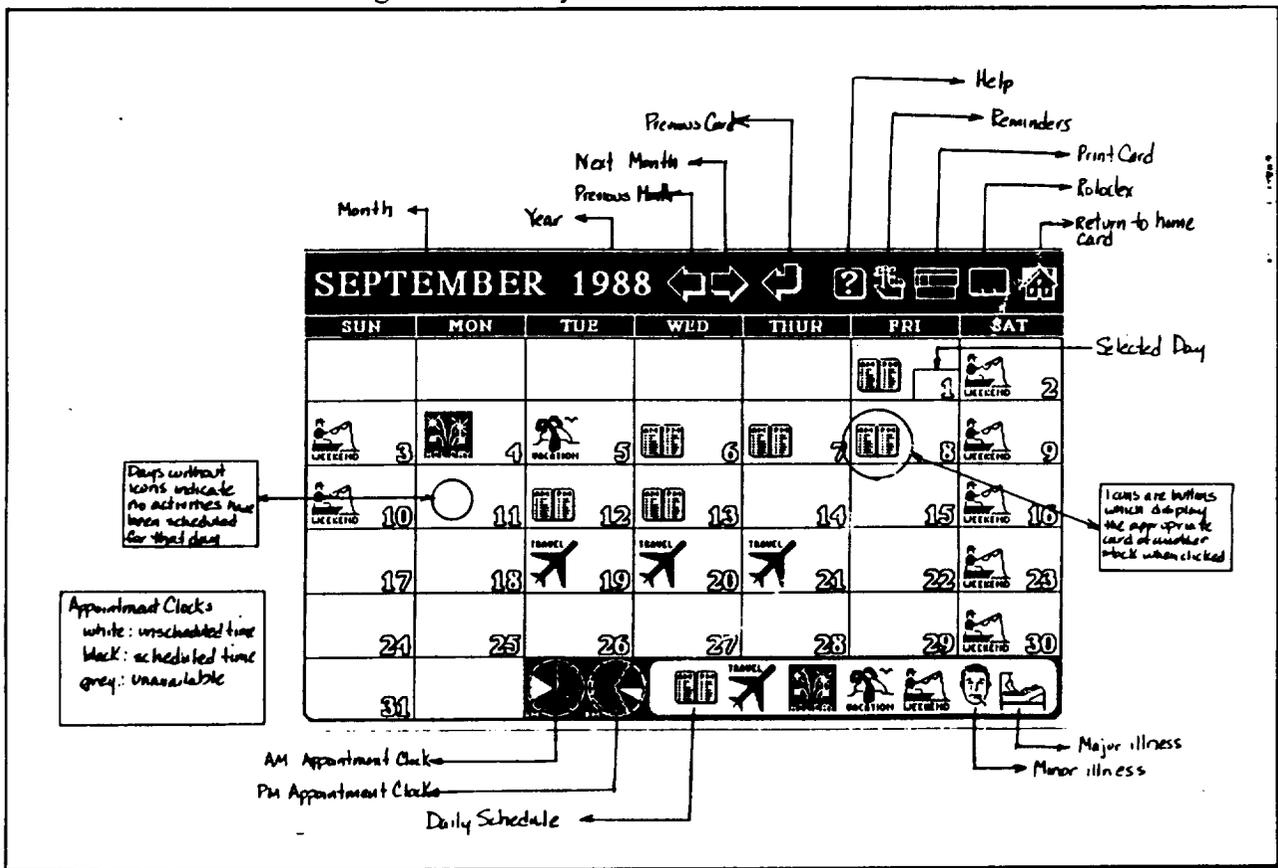
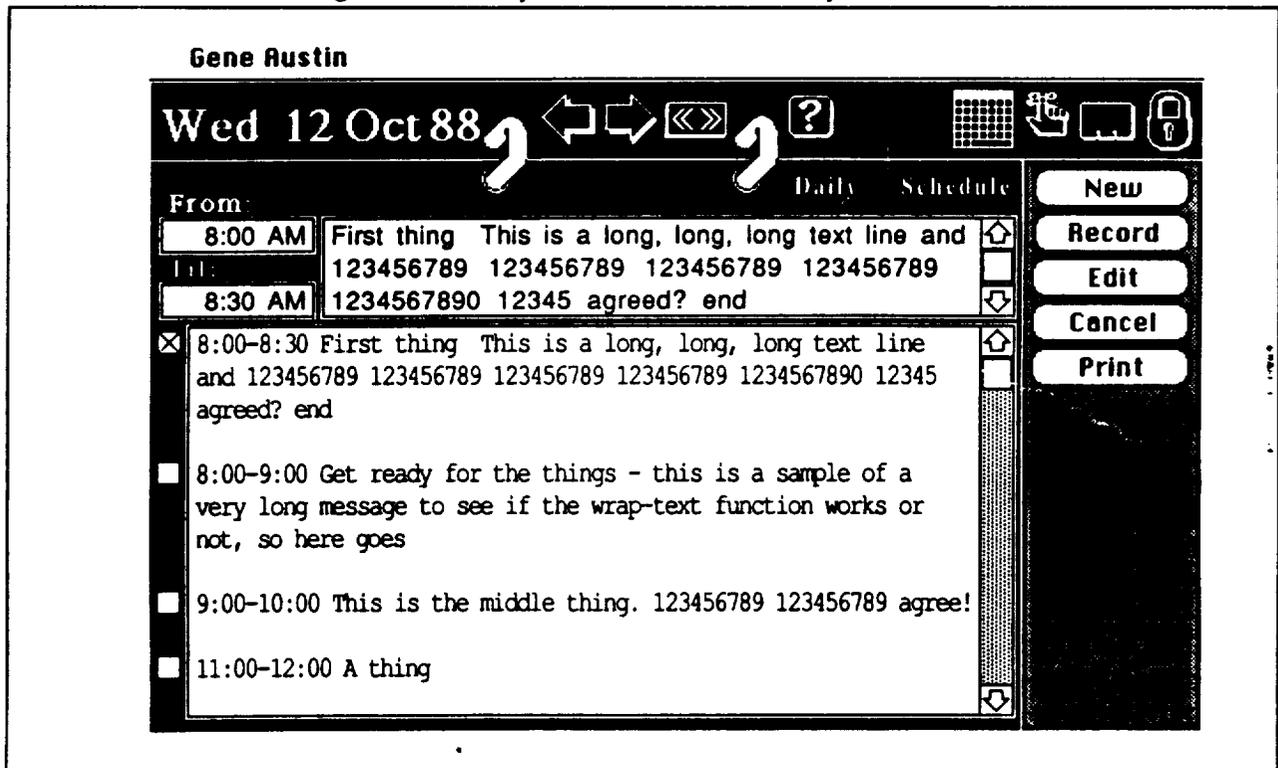


Figure 19 shows an early design version of the calendar. The current day, according to the users computer's internal clock, or the selected day was enclosed by a box around the day of the month numeral. The user could select from the row of icons below to specify his/her planned activity for the day. Icons for travel, holiday, vacation, normal weekends, and major and minor illness were included.

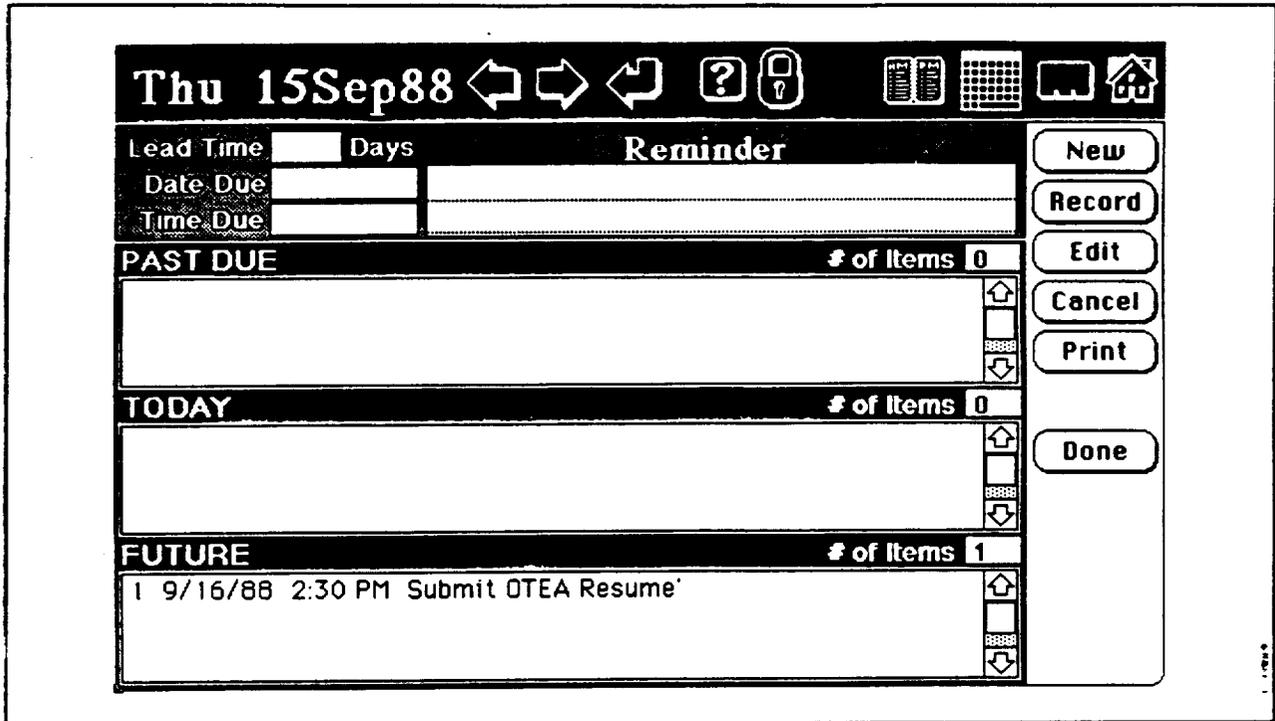
The row of icons at the top were also selectable buttons. These activated forward and backward movement of the month and year being displayed as the calendar. Also there were icon buttons to launch a help function, a function to generate reminder notes to be displayed on specified dates, a LaserWriter icon for printing the calendar, a rolodex function, and a function to return to the homecard.

Figure 20. Early Version of the Daily Schedule



The notebook icon, when clicked by the user, would launch the daily schedule and generate the screen shown in Figure 20. Designed to look like a desktop memo card holder, this was the more detailed level of the daily calendar. The major field was a text field. Standard buttons to the upper right allowed the user to create and print new entries or modify existing daily events shown on the page. Again, arrow buttons at the top allowed for moving back and forward in the calendar. A few additional icons were shown on this page. They included action item reminders, the rolodex, and the lock for personal security of the information. In the upper right corner also was a grid pattern icon. When user clicked this, he was returned to the previous calendar page.

Figure 21. Early Version of the Reminder



The reminder function, shown in figure 21, was keyed to the blackened day on the calendar and energized by the action item button on the homeward and elsewhere. It displayed action items past due, due today, and those becoming due within the next two weeks. Each of the major note areas contained textual information. These test areas were scrollable to accommodate many reminders. The number of different action items was also displayed at the upper right of each of the three reminder fields to prevent hidden reminders from being overlooked. The grey area at the top of the card provided the means to create new reminders and edit existing ones. The standard set of navigation buttons to other screens was included at the very top of the display.

When the meeting icon on the daily schedule screen was picked, the display shown in Figure 22 greeted the user. This provided text fields for giving the purpose, primary location, and alternate location for the meeting. Participants could be selected from the list of PT01 personnel stored in the program to create and review a list of attendees. A meeting status indicator for proposed, tentative, or firm was also displayed along with the date and start and end times for the meeting. In addition, there were two function buttons in the lower right area. The lightning bolt energized the reminder function discussed previously.

Figure 22. Early Version of the Meeting Scheduler

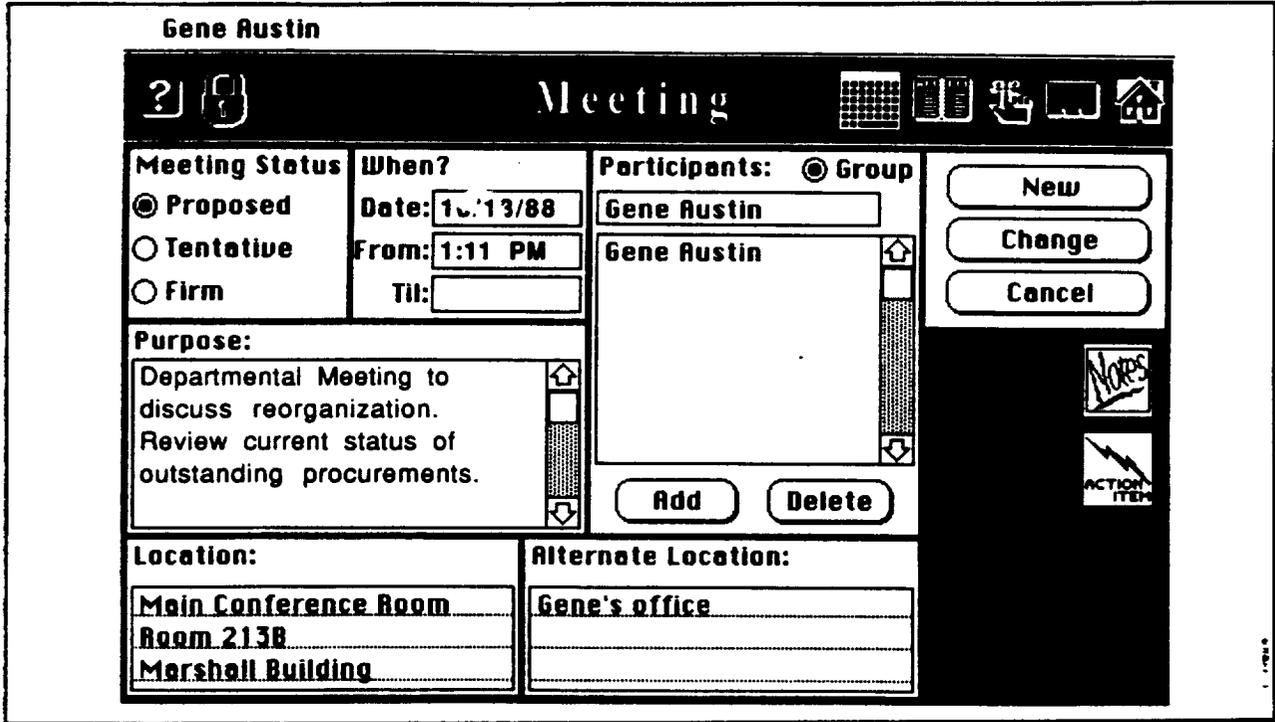
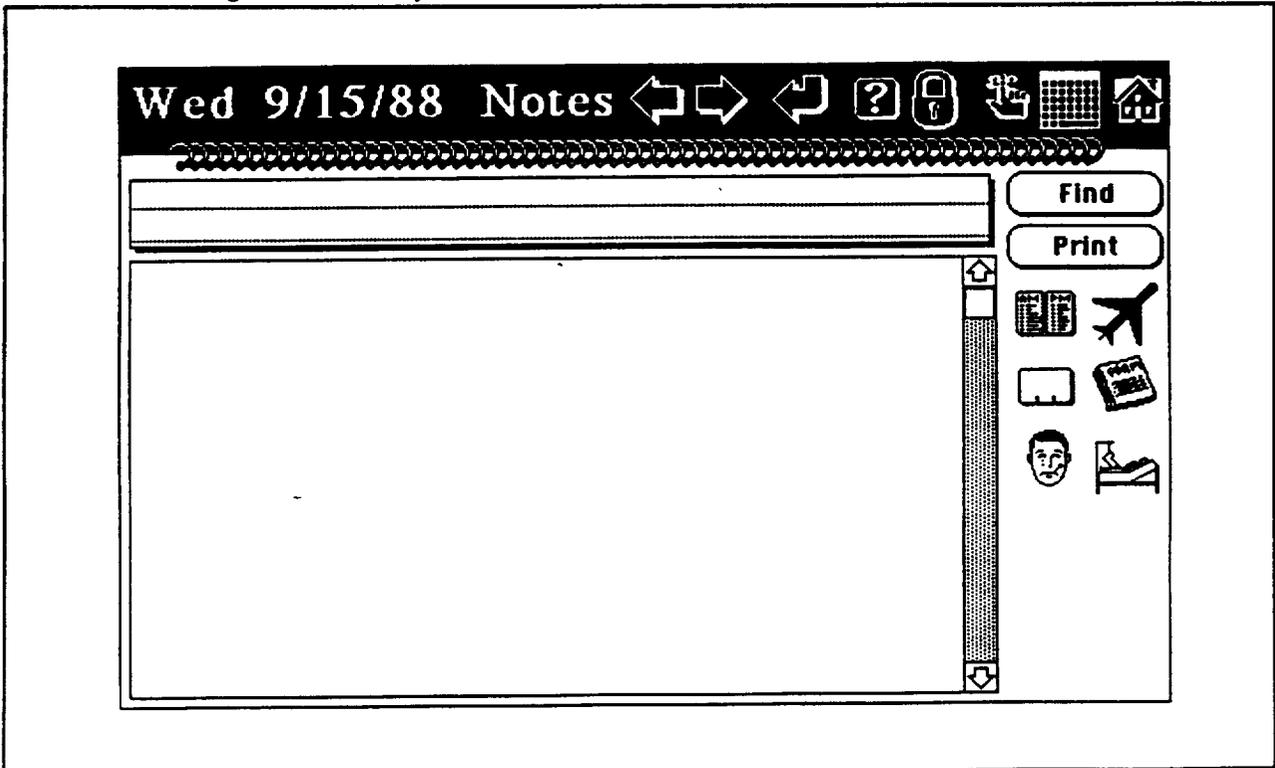


Figure 23. Early Version of the Notes Function with Entries



The "Notes" button provided a means to record and display cogent information related to the meeting. For example, these might be requests that individuals bring certain data products, the attendees should be prepared to discuss certain issues, or for informing that someone may be a few minutes late. Figure 23 shows the design of the "Notes" screen which was primarily a large text area with buttons to navigate across dates and back and forth to the other screens. Buttons to find-by-search-string and print were also provided.

The requirement to provide a calendar that supported not only the individual but the entire organization and the sub-groups of that organization created some significant problems with data security and control. Initially these were resolved by requesting that each user specify future data handling of the item through the screen shown in Figure 24. Three basic questions were asked. Who can see this? Who can change this? Who can delete this? Below these questions appears a list of the organization members for selection of who has access and modify privileges for the information.

Figure 24. Early Version of Access Privileges

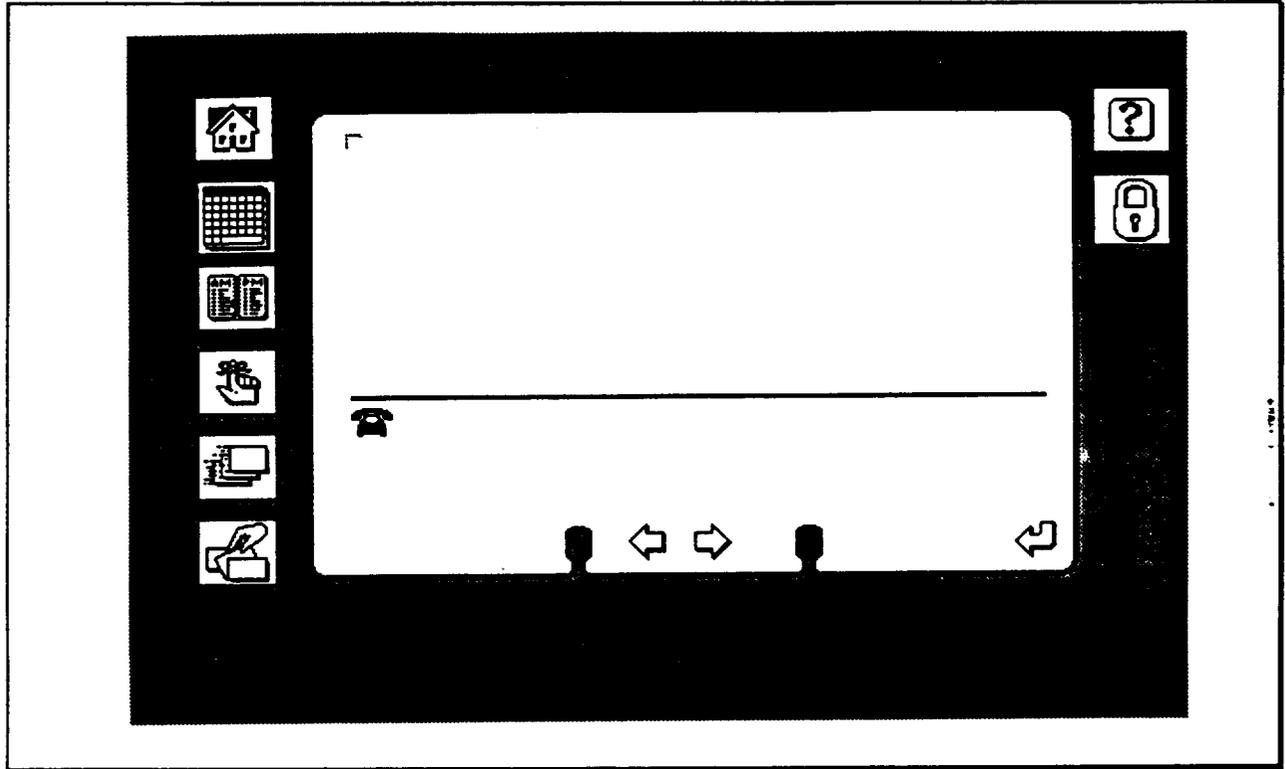
The screenshot shows a window titled "Access Control" with a toolbar at the top containing icons for help, navigation, and home. The main area is divided into three vertical panels:

- Who can see this?**
 - Only I can see it
 - Let all see it
 - Let some see it
 - Read list: group
 - Buttons: Add, Edit, Delete
- Who can change this?**
 - Only I can change it
 - Let all change it
 - Let some change it
 - Edit list: group
 - Buttons: Add, Edit, Delete
- Who can delete this?**
 - Only I can delete it
 - Let all delete it
 - Let some delete it
 - Delete list: group
 - Buttons: Add, Edit, Delete

Each panel has a large empty list area at the bottom with a vertical scrollbar and a home icon at the top right of the list area.

Finally, a Rolodex function was provided for the users to keep phone numbers in. The free HyperCard script for this function was provided by Apple Computer. SRS integrated it into the IO shell where it remains today in virtually the same form. Figure 25 shows the screen displayed by the Rolodex.

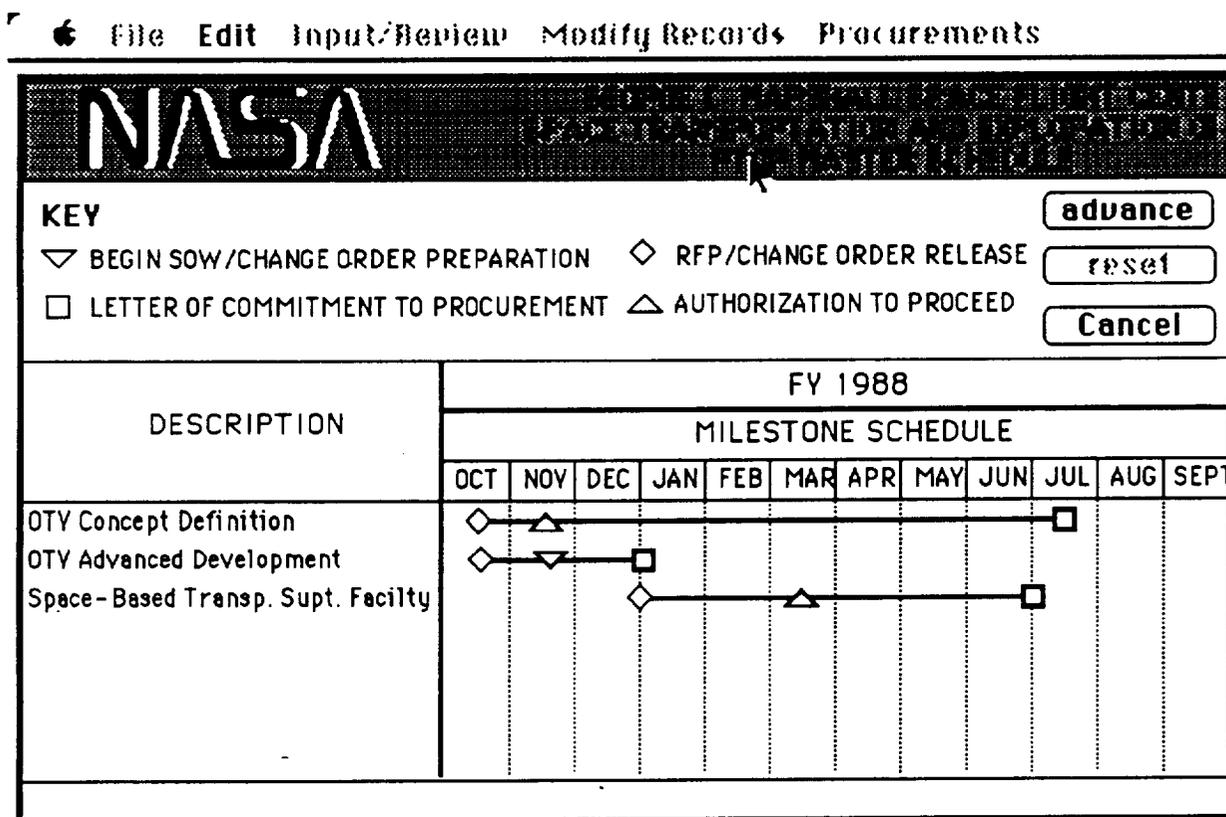
Figure 25. Early Version of the Rolodex



3.6 PROCUREMENT PLANNER

The Procurement Planner used the information obtained on average procurement processing times to produce a Gantt-type schedule chart showing the relationship between major milestones of a number of procurement processes. In producing such a function, the basic codes needed for generalized chart making routines were derived. Procurement Planner was produced as a Fourth Dimension data base application which exported and imported data from the IO HyperCard stacks. Exported data included the dates of upcoming procurement milestones which triggered the reminder screens in IO.

Figure 26. Early version of the Procurement Planner



An early version of the procurement schedule is shown in figure 26. The data displayed on the form included sponsorship, period, schedule scale and depth of milestones considered and was initially conceived as a RTOP Master Schedule since PT01 receives the majority of its project funding through the RTOP process. It

Figure 28. ADD Procurements Form

The screenshot shows a window titled "4th Dimension" with a menu bar containing "File", "Edit", "Go", "Tools", and "Objects". The main content area is titled "Program Development Procurement Input Form".

RTOP Number	200-12-03
Project Leader	Gene Austin
Procurement Type	Full & Open Competition (SEC)
Group Code	PT01
Group Name	Space Trans. & Explor. Office
Sponsor	Code Z
Description	Code Z STV

ATP Date	7/3/90	Calculate
RFP Date	12/1/89	
COMMIT Date	7/25/89	
SOW Date	4/6/89	

At the bottom of the form are three buttons: "CANCEL", "Print", and "SAVE".

Fields for the four major procurement milestone dates could be used in one of two ways. First, the user could specify their own date targets and simply enter them in the date format shown. Alternately, the user could select the date on which they planned to have the contractor start work (ATP date) and IO would back-schedule the other three milestones when the calculate button was clicked. The dates were calculated from the information discussed previously in Section 3.3 Data Collection and Preparation. This form is formatted so that when printed it is immediately suitable for a presentation chart.

This process automatically generated a special data item for the reminder function of IO. At 10 days before the due date of these milestones, IO would display the message shown in Figure 29. Note the message box is superimposed on top of the homecard. On those days (according to the computer's internal clock) when reminders were activated, IO required acknowledgement of receipt of the message before any other function could be performed.

Figure 29. 10-Day Reminder Box

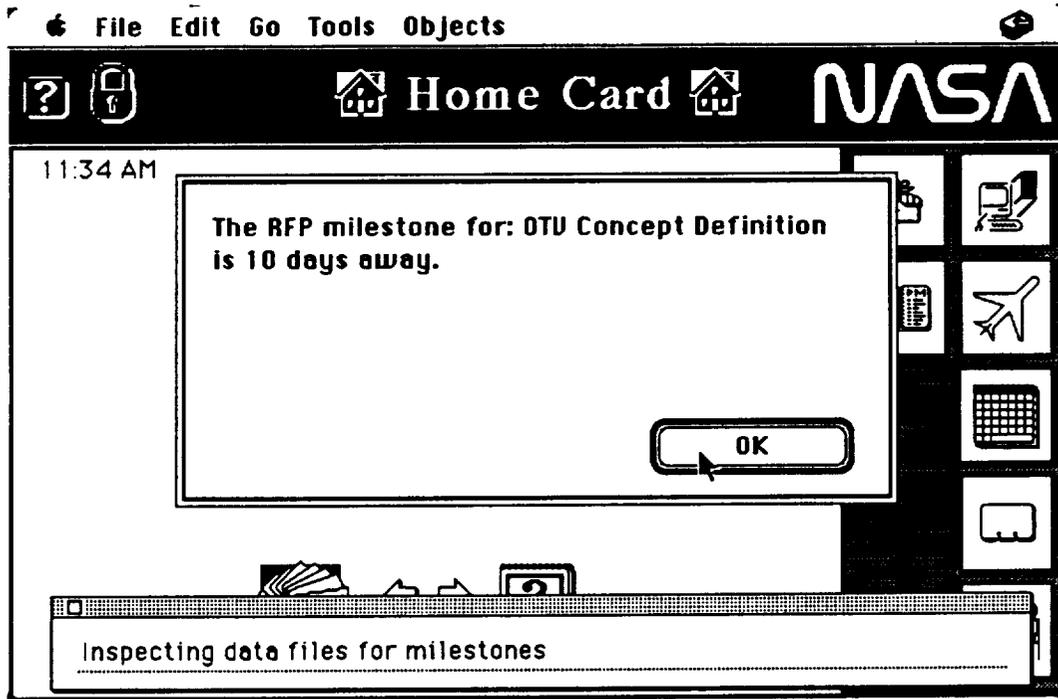
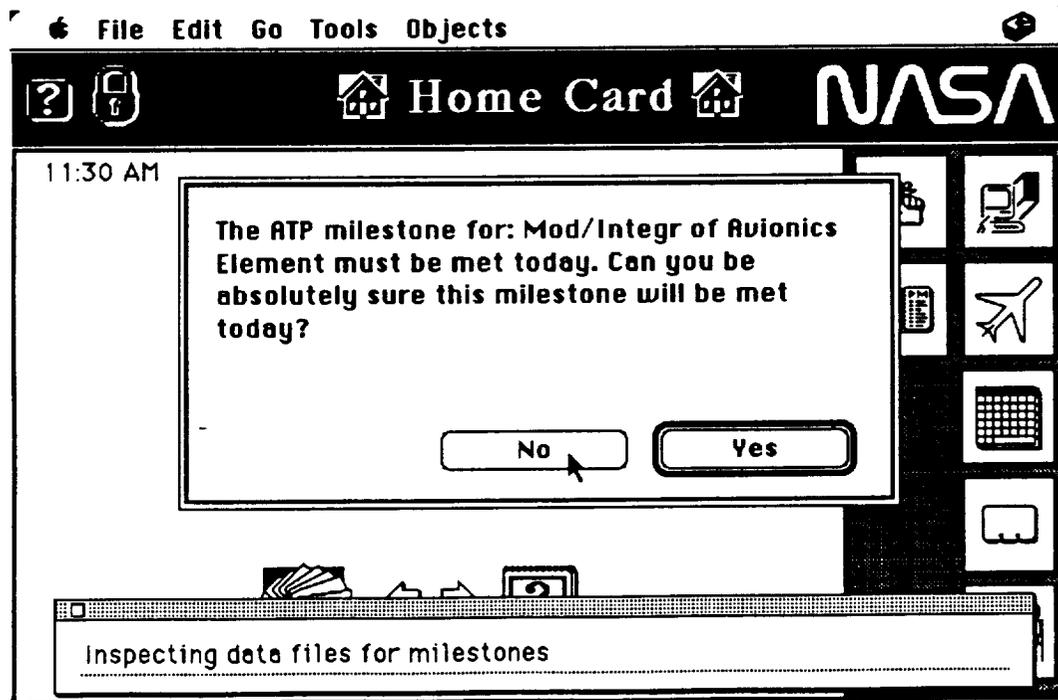
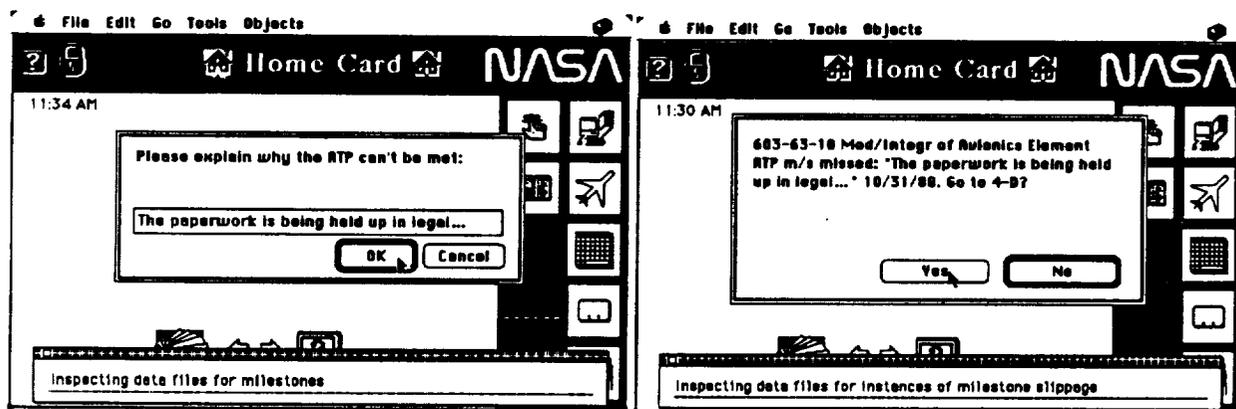


Figure 30. Due Day Reminder Box



Furthermore, on the day of the milestone due date, the reminder shown in Figure 30 was displayed. This reminder required that the user inform IO on whether or not the milestone would be completed. A YES sent the user back to the homecard. a NO answer prompted the user to enter a brief message which then appeared as a department manager's reminder box. The manager's IO then followed through by giving the option launch procurement planner so that the milestones could be edited and updated to reflect slippage. The dialogs for this process are shown in Figure 31.

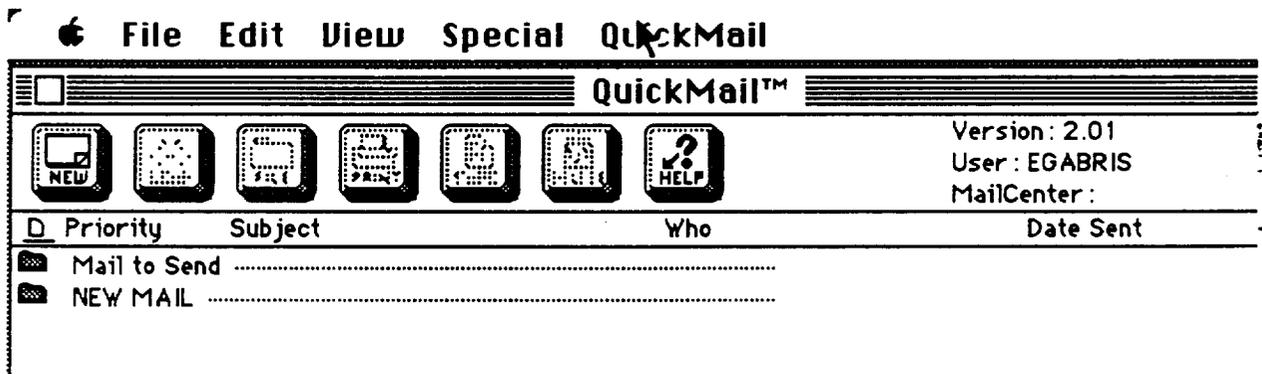
Figure 31. Milestone Slip Explanation and Notification Boxes



3.7 ELECTRONIC MAIL

Several different software products to provide electronic mail were considered including Microsoft Mail, TOPS, and others. CE Software's Quickmail had several features of interest and was chosen for implementation. Its compatibility with AppleShare and AlisaShare was no small factor in the decision. Quickmail can span bridges and internets, be accessed remotely from off-site via modem, has a teleconferencing feature, and seamlessly routes up to sixteen attached file per each message. Figure 32. shows an example of the QuickMail user interface.

Figure 32. Quickmail



A network was established in PT01 and at NASA Headquarters/Code MD. Table 3 below shows the Mailcenters currently established.

Table 3. QuickMail Mailcenters

The screenshot shows the 'QM Administrator' utility window. The menu bar includes 'File', 'Edit', 'User', and 'Utilities'. The title bar reads 'QM Administrator'. Below the title bar is a table with columns: 'MailCenters', 'VIA', 'Time to Call', '* Messages', and '* Urgent'. The table lists five mailcenters: GD_HUNTSVILLE, MD, PA, PT, and STV_CONTRCTRS, all with 'Online' status.

MailCenters	VIA	Time to Call	* Messages	* Urgent
GD_HUNTSVILLE	Online			
MD	Online			
PA	Online			
PT	Online			
STV_CONTRCTRS	Online			

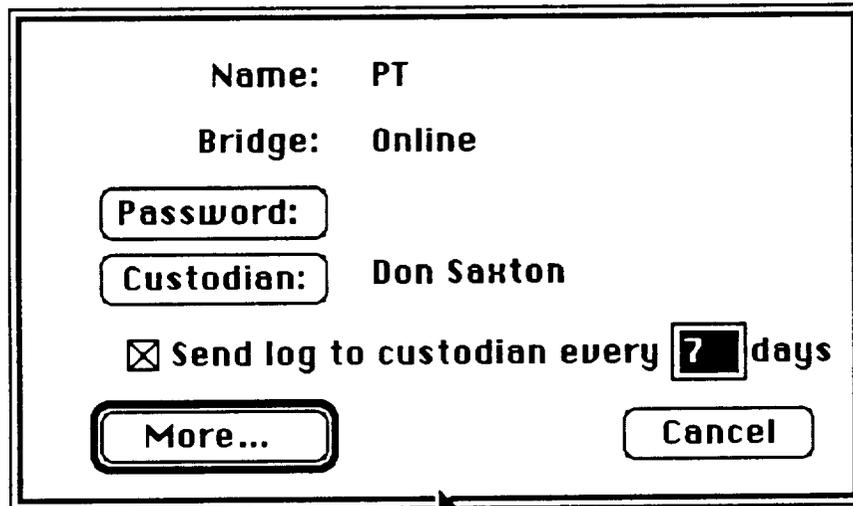
A number of users were established for each mailcenters. These users included the personnel of PT01 in their mailcenter and a number of users in mailcenters with whom PT01 frequently corresponds. These other centers included PA at MSFC, Code MD at NASA Headquarters, General Dynamics in Huntsville, and other contractors and subcontractors in on-going projects. Table 4 below lists the users.

Table 4. QuickMail Users

PT	GD_HUNTSVILL	MD
Users	Users	Users
<input type="checkbox"/> AUSTIN_RE	<input type="checkbox"/> Ned Hughes	<input type="checkbox"/> BASKINS
<input type="checkbox"/> DURRETT_RH	<input type="checkbox"/> John Olds	<input type="checkbox"/> CHOLLIMAN
<input type="checkbox"/> HUETER_U	<input type="checkbox"/> George Philyaw	<input type="checkbox"/> CUNDERWOOD
<input type="checkbox"/> HUFFAKER_CF	<input type="checkbox"/> Joe Szedula	<input type="checkbox"/> DBRANSCOME
<input type="checkbox"/> JOHNSON_GW	<input type="checkbox"/> Monica Weisenberg	<input type="checkbox"/> EGABRIS
<input type="checkbox"/> LOVEDAY_CA		<input type="checkbox"/> GLEVINE
<input type="checkbox"/> NIXON_RF	STU_CONTRACT	<input type="checkbox"/> PCONNER
<input type="checkbox"/> PRIEST_CC	Users	<input type="checkbox"/> PHERR
<input type="checkbox"/> SAXTON_DR	<input type="checkbox"/> BOEING_HUNTSVIL	<input type="checkbox"/> RBRISTOW
<input type="checkbox"/> SUMRALL_JP	<input type="checkbox"/> BOEING_SEATTLE	<input type="checkbox"/> RDAVIES
<input type="checkbox"/> VARNADO_CL	<input type="checkbox"/> GD_SANDIEGO	<input type="checkbox"/> RHARRIS
<input type="checkbox"/> WALDEN_EC	<input type="checkbox"/> MARTIN_DENVER	<input type="checkbox"/> RKADUNC
<input type="checkbox"/> WIEGMANN_BM	<input type="checkbox"/> MARTIN_MICHOUD	<input type="checkbox"/> RMOE
	<input type="checkbox"/> SRS_HUNTSVILLE	
PA		
Users		
<input type="checkbox"/> PARKS_RW		

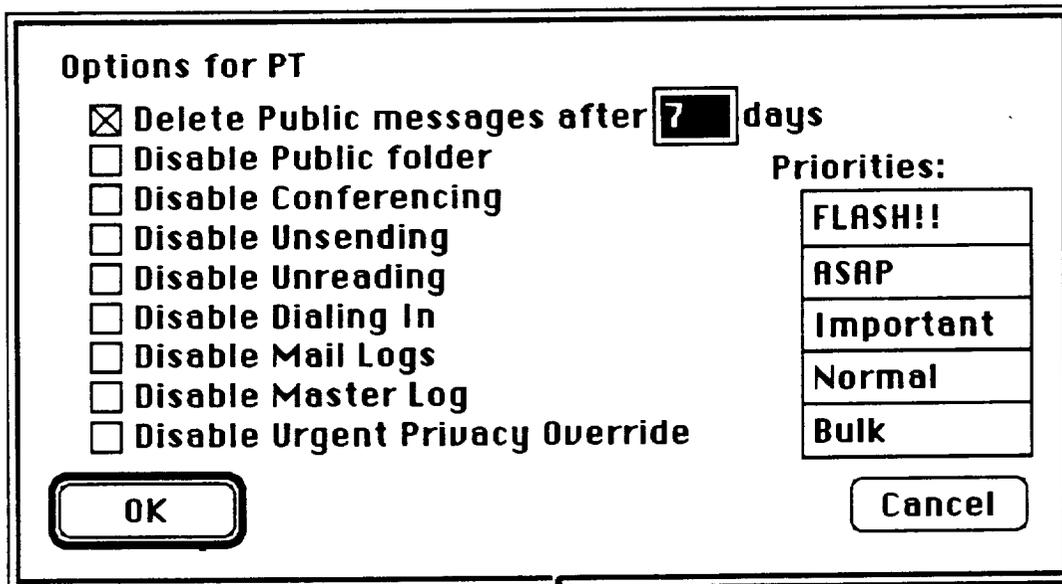
The IO server hosted these mailcenters. They were established with Don Saxton of MSFC/PT as the custodian. Figure 33 lists the configuration parameters of the milestones. Only the automatic deletion of old public messages was disabled.

Figure 33. QuickMail Configuration Parameters selected for IO



A dialog box titled "QuickMail Configuration Parameters" with the following fields and controls:

- Name: PT
- Bridge: Online
- Password: (empty text field)
- Custodian: Don Saxton
- Send log to custodian every 7 days (the number 7 is in a small box)
- More... (button)
- Cancel (button)

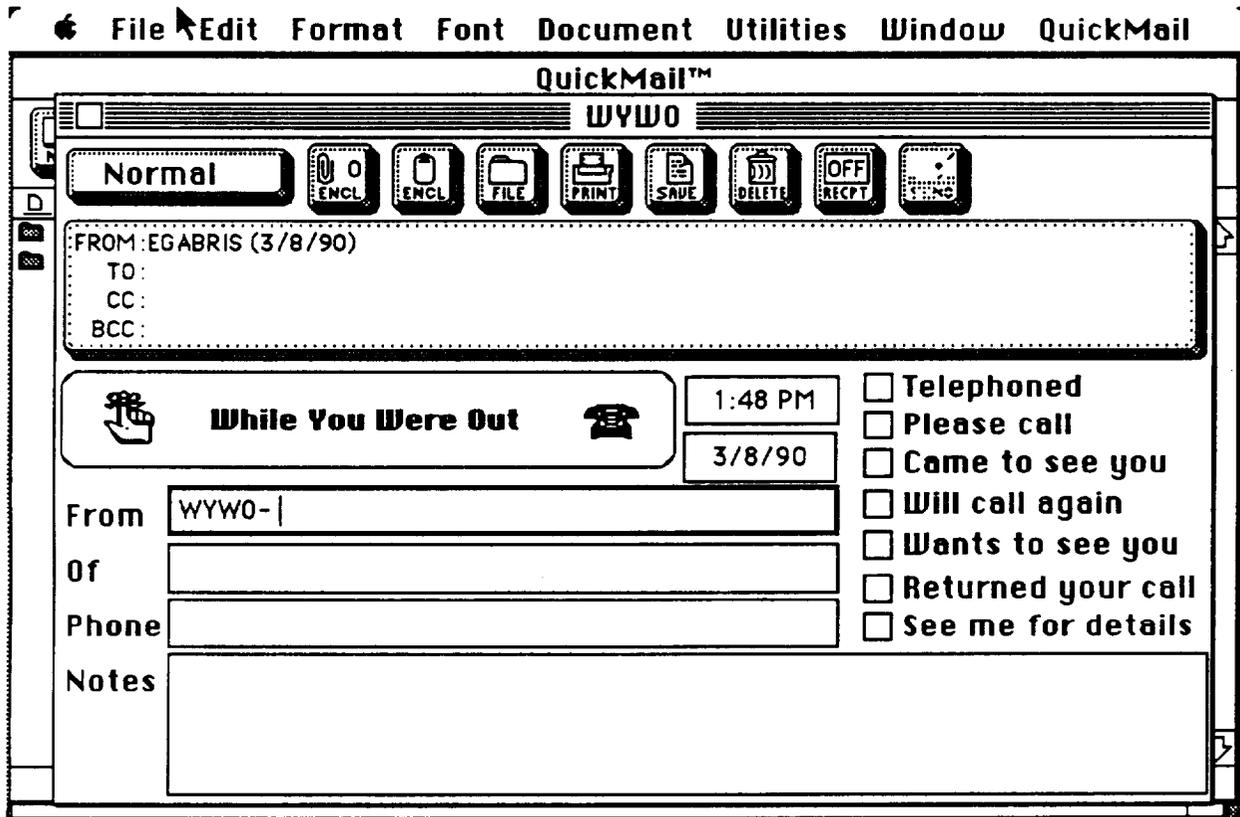


A dialog box titled "Options for PT" with the following options and controls:

- Delete Public messages after 7 days (the number 7 is in a small box)
- Disable Public folder
- Disable Conferencing
- Disable Unsending
- Disable Unreading
- Disable Dialing In
- Disable Mail Logs
- Disable Master Log
- Disable Urgent Privacy Override
- Priorities: (list box)
 - FLASH!!
 - ASAP
 - Important
 - Normal
 - Bulk
- OK (button)
- Cancel (button)

Figure 34 shows the standard QuickMail screen for a WYWO message. The send button produces a list of users created by the user in a personalized directory. Addressing is as easy as clicking on the recipients Mailbox name. The two clipboard buttons are for text and binary file attachments. A full explanation of QuickMail is available in the QuickMail user's guide.

Figure 34. Example QuickMail Screen



3.8 STANDARD FORMS

Another area identified for significant advantages from paperless office management was the use of standard forms. The best candidates for electronic forms generation and tracking identified were:

- RTOP Forms
- Non-Supervisory Appraisal Form
- Telefax Lead Sheets
- NASA Letterhead
- Supervisory Performance Appraisal
- Data Requirements Forms

RTOP forms were given highest priority and are discussed separately in the next section. Several Versions of NASA letterhead were produced including formats in FullWrite Professional and MacWrite II. This was never developed into a data base application because the word processing capabilities on text fields within the 4th dimension program are primitive. Too much functionality would have been lost. Instead, a standard default format for those word processing packages were developed. A set of Non-Supervisory Appraisal Forms was produced in MacDraw II and is shown in Figures 35, 36, and 37. The form overlay was imported to Fourth Dimension where text fields were set up and a custom menu application produced. This effort led the way to techniques which were eventually employed in the MacRTOP forms. A significant lesson was learned in the effort expended to faithfully reproduce the GPO. Once the image was imported into 4D it was too wide to display on a standard 9" diagonal Macintosh screen. Scrolling for the right two inches of the form significantly bothered the users. Therefore, it becomes necessary to redesign standard forms to a smaller horizontal margin to remain compatible with the large number of users without oversized monitors. A second lesson was learned in the method used to build a display image. 4D supports the importing of background designs or the creation of the design in 4D. While more sophisticated graphics can be produced by other programs such as MacDraw or Adobe Illustrator, they do not interact well with overlaid fields in the data base design and are so rigid they constitute a significant bottleneck in design modifications. The appraisal forms data base was developed to a state of proof-of-principle and is usable, but only by an expert in the 4D design environment. More development is needed before it is ready for integration into IO. Supervisory Performance Appraisal, Telefax Lead Sheets, and Data Requirements Forms were deferred to later projects since Don Saxton/PT had already created versions of many of them.

Nonsupervisory Performance Appraisal

Name _____

Title and Organization _____

Performance Period From _____ To _____

INSTRUCTIONS

- I. **Performance Planning.** -- This phase of the appraisal process involves the development of a performance plan which establishes the employee's performance expectations for the upcoming appraisal period.
 1. In Column 1, identify the job elements for the appraisal period and designate those which are critical with an asterisk. If the duty statements in the position description are adequate, it is only necessary to record the appropriate numbers and letters. If more specific job element language is desirable, the duty statements to which they relate are to be cited.
 2. In Column 2, record the performance requirements for each job element which describes the level of achievement required for a Meets rating. When specific projects, tasks, or actions are included in the performance plan, they may also be recorded here.
 3. Both the supervisor and employee certify in the space provided that the performance plan has been discussed and understood. The supervisor also certifies the position review and job relatedness statement.
- II. **Progress Review.** -- Changes to the performance plan as a result of progress reviews should be made as continuations, modifications, or deletions of Columns 1 and 2. The supervisor and employee should initial and date all changes.
- III. **Performance Assessment.** -- At the end of the appraisal period, performance is assessed by comparing the employee's accomplishments to the performance requirements specified in the performance plan.
 1. In Column 3, enter an X in the appropriate subcolumn for each job element, and provide comments / rationale in Column 4, for any rating other than Meets.
 2. The General Narrative Summary is to be a statement of the significant aspects of total job performance and rationale for the overall rating which is recorded in the designated location. A rating of Fails to Meet on any critical element precludes an overall rating at Outstanding, Highly Successful, or Successful levels.
 3. After review by the reviewing official, the supervisor discusses the appraisal with the employee and gives him / her a copy of the form. At this point, the employee acknowledges receipt of the completed appraisal form and may request a reconsideration.

INDIVIDUAL JOB ELEMENT RATING LEVELS

1. Exceeds. -- Performance of a job element clearly exceeds the performance requirement.
 2. Meets. -- Performance on a job element fully meets the performance requirements.
 3. Fails to Meet. -- Performance on a job element does not fully meet the performance requirement. This rating should be assigned to performance which ranges from not meeting the requirements in substantial part, to performance which almost meets the requirements.
- level would be when one half or more of the critical and noncritical job elements are rated Exceeds and no job elements are rated below Meets.
3. Successful. -- Fully meets the performance requirements for the total position. An indicator of overall performance at this level would be when all critical job elements are rated Meets or above.
 4. Minimally Satisfactory. -- Does not fully meet the performance requirements for the total position. An indicator of overall performance at this level would be when the performance requirement for a critical job element is not fully met.
 5. Unsatisfactory. -- Fails to meet the performance requirements for the total position to a substantial degree. An indicator of overall performance at this level would be when the performance requirements for two or more critical elements are not fully met, or when the performance requirements for one or more critical elements are not met in substantial part.

OVERALL RATING LEVELS

1. Outstanding. -- Exceeds the performance requirements for the total position to an exceptional degree. An indicator of overall performance at this level would be when all job elements are rated exceeds.
2. Highly Successful. -- Exceeds the performance requirements for the total position to a substantial degree. An indicator of overall performance at this

DISPOSITION OF RECORD: This record is subject to the provisions of the Privacy Act. Copies will be retained by the supervising official for 3 years and provided for review and retention, as required, for those having a need to know.



Nonsupervisory Performance Appraisal

PAGE ____ OF ____ PAGES

EMPLOYEE NAME

TITLE AND ORGANIZATION

POSITION NO.

PERFORMANCE PERIOD (Dates)
FROM _____ TO _____

I. PERFORMANCE PLANNING

II. PERFORMANCE ASSESSMENT

1. JOB ELEMENTS (Identify critical elements with an asterisk (*))	2. PERFORMANCE REQUIREMENTS		3. RATING *		4. ASSESSMENT COMMENTS
	DATE	DATE	E	M F	

PLAN DISCUSSED AND UNDERSTOOD		POSITION CONTENT HAS BE REVIEWED AND THE JOB ELEMENTS AND PERFORMANCE REQUIREMENTS IDENTIFIED ARE CONSISTENT WITH THE POSITION	
SUPERVISOR	SIGNATURE	DATE	DATE
EMPLOYEE	SIGNATURE	DATE	DATE

* E - Exceeds; M - Meets; F - Fails to Meet



Nonsupervisory Performance Appraisal

PAGE ____ OF ____ PAGES

EMPLOYEE NAME

TITLE AND ORGANIZATION

POSITION NO.

PERFORMANCE PERIOD (Dates)
FROM TO

I. -- PERFORMANCE PLANNING

II. -- PERFORMANCE ASSESSMENT

1. JOB ELEMENTS (Identify critical elements with an asterisk (*))

2. PERFORMANCE REQUIREMENTS

3. RATING *
E M F

4. ASSESSMENT COMMENTS

PLAN DISCUSSED AND UNDERSTOOD

SIGNATURE

DATE

POSITION CONTENT HAS BE REVIEWED AND THE JOB ELEMENTS AND PERFORMANCE REQUIREMENTS IDENTIFIED ARE CONSISTENT WITH THE POSITION

SIGNATURE

DATE

SUPERVISOR'S SIGNATURE

DATE

* E -- Exceeds; M -- Meets; F -- Fails to Meet

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3.9 MacRTOP

A significant effort is expended each year in the production of a set of standard forms in conjunction with the Research and Technology Objectives and Plans (RTOP) activity. This project took the standard forms and designed a customized data base application around them. PT01 used these forms in its preliminary RTOP work in late 1988. Later, NASA Headquarters took over maintenance and operation of this software package, called MacRTOP.

Figure 38. Key MacRTOP Features

SRS TECHNOLOGIES	Code MD MacRTOP Electronic Database <i>Paperless Management Information System - Center Function</i>
<ul style="list-style-type: none">• MacRTOP Supports<ul style="list-style-type: none">- RTOP Origination, Review/Modification, Electronic Signatures • Key Features<ul style="list-style-type: none">- Accurate Reproduction of Standard NASA Forms (1471, 1471a, 1471b, 1588)- Fills Redundant Blocks of Forms Automatically (Dates, Center Name. . .)- Calculates Funding Requirements (Based on IMS Rates and Task Entries)- Plots Schedule of Tasks for Each RTOP Entry • Electronic Data Transfer Submittal Paths<ul style="list-style-type: none">- Direct Access to File Server on NASA HQ VAX- NASAMail Binary File Transfer to Code MD- Direct Modem Connection to Code MD Macintosh	

Chart 2 of 6

Figure 38 above outlines the key features of MacRTOP. They included ease of use, accurate reproduction of the GPO standard forms, automatic filling of redundant blocks, built in funding requirements calculations, and a schedule graphic. MacRTOP supported origination, review, modification, signature, and baselining of RTOPs. Elusive software bugs in drawing the schedule graphics caused it to be dropped from the package. Since it was not a standard form outside of MSFC, the lost value to MacRTOP was low. The bugs were later resolved in the

development of the Procurement Planner schedule chart. The structure of the MacRTOP data base is depicted in Figure 39. MacRTOP also included a built-in password security system and a change notes audit trail feature. The flow diagram shown in Figure 40 depicts the utility of MacRTOP in the processing of RTOPs between the originating centers and NASA Headquarters.

Figure 39. MacRTOP Data Base Structure

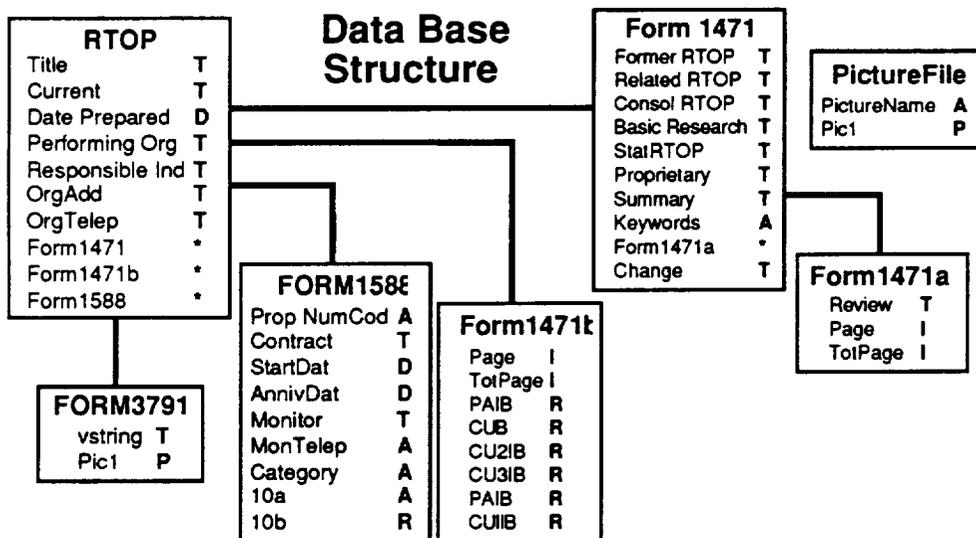
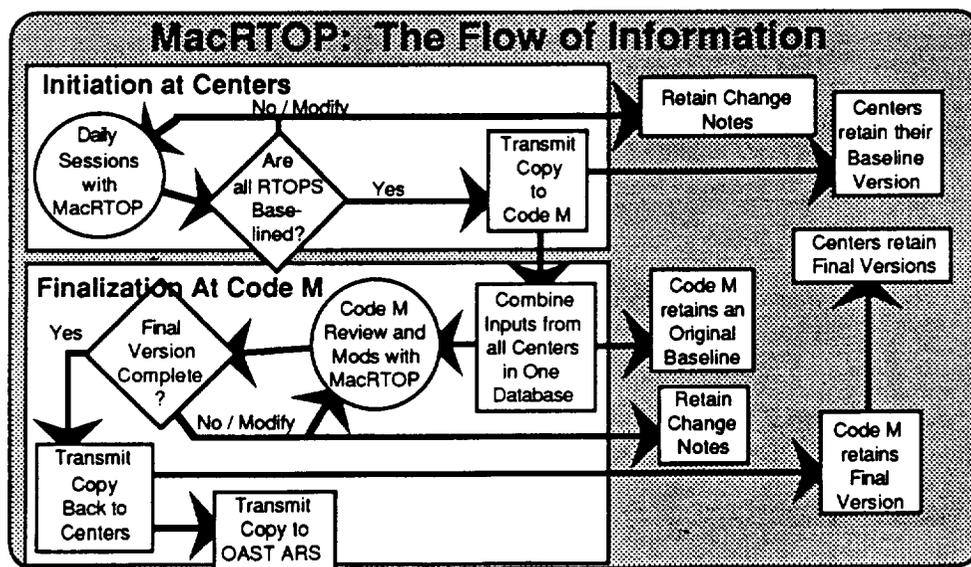
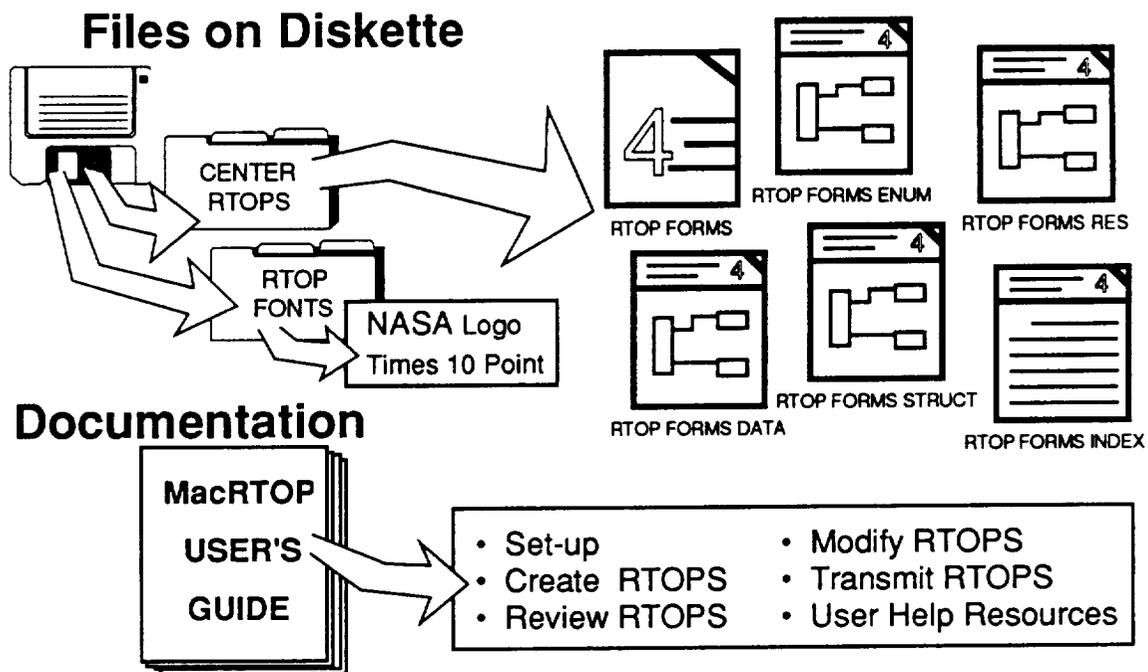


Figure 40. MacRTOP: The Flow of Information



Eventually, MacRTOP packages were distributed to all NASA centers. Figure 41 illustrates the contents of the packages sent to each center. For a more complete description, Appendix C contains the MacRTOP version 1.0 User's Guide. Today, MacRTOP is being used to accomplish a totally electronic, paperless, submission of RTOPs.

Figure 41. MacRTOP Distribution Package



4.0 RECOMMENDATIONS FOR FUTURE ENHANCEMENTS

The development of IO is at a critical stage. Its major functions have been refined and are basically operational without flaw. However, there are still a few dead end paths users can access when not using the program in the standard ways for which it was intended. In order to fully achieve the benefits of IO, an extensive effort to bullet-proof the software by providing it fault tolerance capabilities. User-training tools and techniques are also in need of improvement. Some training was attempted, but the disruption caused by the sequestering of much of PT01 off-site during the Lunar/ Mars Initiative came at a critical time. Users were not available for comment, workstations and networks were removed and/or rearranged, and development efforts were, in general, deferred in the need for expediency and security.

Several of the standard forms developments have been deferred to a later program including the Supervisory Performance Appraisal, Telefax Lead Sheets; and Data Requirements Forms. The Non-Supervisory Appraisal Forms are in need of more testing by the users. The Fourth Dimension application for hosting the Appraisal forms should be refined and the user interface developed. The seamless interface with the DG management information system is perhaps the most powerful expansion needed to bring the IO system into the center of office practices in PT01. Project Scheduler should be expanded into a generalized schedule chart function for the reporting of technical progress as well as procurement processing progress. Travel Orders could be hosted in a paperless system. Electronic mail training is still in need along with maintenance of personal and group directories and interfaces with study contractors. Also, a method should be established for the reporting of project technical data. Quad charts for each of the discipline area of mission analysis, concept designs, technology, cost, and schedule should be centrally reported, accessible, and archived. A standard set of quad charts has become established as the recommended format for reporting Program Operating Plans (POP). An electronic host for the POP forms and process similar to the MacRTOP product would have similar benefits and provide additional capabilities when common program management data from teach is integrated together in a single system. Additional data for forecasting procurement milestones associated with the NRA and Task Ordering type procurements should be developed and integrated with the basic set of procurement types already in the Procurement Planner.

In a broader view, it is also time to reconsider the hosting software for much of IO. At the outset of this project, HyperCard had just been released and was unique in its level of interface to system level functions. Unfortunately, it is somewhat slow in operation. This, in itself represents the major stumbling block to IO's acceptance. Although an alternate desktop environment was built and is available in IO, it operates much slower than the Apple Finder due to the interpreter compilation of HyperCard. Most users avoided the built-in IO desktop, preferring to quit the program entirely thus losing any of its benefits except the electronic mail and MacRTOP features. This was understood at the outset of the project. Trade journals at that time predicted the release of a compiled version of HyperCard with at least a ten-fold increase in execution speed within a year. It didn't happen. Some experts now predict it will never be fully accomplished. HyperCard version 2.0 is expected to be released very soon, though, and is expected to provide at least partial compiler functionality and speed. If so, IO would gain a large edge in user-friendliness if rehosted to the upgraded HyperCard software.

At the same time, third party developers have created an external function for Fourth Dimension which will allow it to access XCMD. As a result, it may now be possible to host virtually all IO functions within a 4D application. This would have certain advantages in maintenance of the system, provide additional security features, make true multi-user file sharing possible, and upgrade the basic data structures supporting IO from flat to relational files. These alternatives deserve consideration and study before continuing on with any further IO development.

Finally, much of the administrative burden associated with a multi-user network of software is usually developed into a separate stand-alone software product which runs concurrently on the fileserver. Examples are the AppleShare Administrator and QuickMail administrator. The administrative burden is currently being distributed among the user's and the user's software. There are features on the calendar card for configuring the groups and adding members to the groups. This should be removed and placed in an administrative package. Also, there are segments of code in the homkecard which must ask the user to locate the central files on the fileserver. These are examples of things with which users should not have to bother. Other functions, such as the department manager's roll-up of activities and the reporting of milestone reminder responses would be good candidates for an IO administrator versus and IO User.

Project Table for a Limited Competition Requiring SEB (Phase C/D Studies)

	Task Name	Days	Earliest Start	Earliest Finish	Latest Start	Latest Finish
1	GO-AHEAD ON LIMITED	0	1/1/88	1/1/88	1/1/88	1/1/88
2	PREPARE INITIAL SOW	10	1/1/88	1/15/88	1/1/88	1/15/88
3	PREPARE PIA/RFP SOW FIRST DRAFT	40	1/15/88	3/11/88	1/22/88	3/18/88
4	PREPARE MASTER BUY PLAN	5	1/15/88	1/22/88	1/15/88	1/22/88
5	PREPARE PROCUREMENT	10	1/22/88	2/5/88	1/22/88	2/5/88
6	EVALUATION PLAN/RFP FINALIZED	18	3/11/88	4/6/88	3/18/88	4/13/88
7	PREPARE DRAFT CBD SYNOPSIS AND	10	1/1/88	1/15/88	4/4/88	4/18/88
8	HOLD PRE-DEVELOPMENT REVIEW	5	3/11/88	3/18/88	3/23/88	3/30/88
9	HOLD BUSINESS STRATEGY MEETING	5	1/15/88	1/22/88	3/16/88	3/23/88
10	PREPARE MISSION REAFFIRMATION	10	1/22/88	2/5/88	2/5/88	2/19/88
11	MASTER BUY PLAN MSFC APPROVAL	10	1/22/88	2/5/88	2/5/88	2/19/88
12	PROCUREMENT PLAN/SEB LETTER	10	2/5/88	2/19/88	2/5/88	2/19/88
13	CBD SYNOPSIS SENT TO CBD	0	1/15/88	1/15/88	4/18/88	4/18/88
14	HOLD PRE-DEVELOPMENT REVIEW	5	3/18/88	3/25/88	3/30/88	4/6/88
15	PRESENT PIA/RFP SOW TO MSFC	5	4/6/88	4/13/88	4/13/88	4/20/88
16	MISSION NEED STATEMENT HQ	23	2/5/88	3/9/88	2/19/88	3/23/88
17	PROCUREMENT PLAN/SEB LETTER	23	2/19/88	3/23/88	2/19/88	3/23/88
18	MASTER BUY PLAN HQ APPROVAL	23	2/5/88	3/9/88	2/19/88	3/23/88
19	CBD SYNOPSIS PUBLISHED	23	1/15/88	2/17/88	4/18/88	5/19/88
20	OBTAIN AUTHORITY TO INITIATE	0	1/22/88	1/22/88	3/23/88	3/23/88
21	PRELIMINARY PROJECT INTIITATION	10	3/25/88	4/8/88	4/6/88	4/20/88
22	PRESENT PIA/RFP SOW TO DA01	8	4/13/88	4/25/88	4/20/88	5/2/88
23	TWO WEEK NOTICE PERIOD IN CBD	10	2/17/88	3/2/88	5/19/88	6/2/88
24	SEB REVIEW/UPDATE OF PIA/RFP	28	3/23/88	5/2/88	3/23/88	5/2/88
25	HQ APPROVAL OF PIA/RFP SOW	23	5/2/88	6/2/88	5/2/88	6/2/88
26	RFP RELEASE	30	6/2/88	7/14/88	6/2/88	7/14/88
27	RECEIVE PROPOSALS	0	7/14/88	7/14/88	7/14/88	7/14/88
28	INITIAL EVALUATION	23	7/14/88	8/16/88	7/14/88	8/16/88
29	PREPARE COMPETITIVE RANGE &	23	8/16/88	9/16/88	8/16/88	9/16/88
30	COMMENTS ON COMP. RANGE &	3	9/16/88	9/21/88	9/16/88	9/21/88
31	COMMENTS ON COMP. RANGE &	3	9/16/88	9/21/88	9/16/88	9/21/88
32	PREPARE AND SEND CHARTS TO	1	9/21/88	9/22/88	9/21/88	9/22/88
33	COMPETITVE RANGE	5	9/22/88	9/29/88	9/22/88	9/29/88
34	NOTICE TO OFFERORS	1	9/29/88	9/30/88	9/29/88	9/30/88
35	WRITTEN AND ORAL RESPONSES	15	9/30/88	10/21/88	9/30/88	10/21/88
36	RECEIVE BAFO OFFERS	5	10/21/88	10/28/88	10/21/88	10/28/88
37	BAFO EVALUATION	10	10/28/88	11/11/88	10/28/88	11/11/88
38	PREPARE/ RELEASE BAFO	10	11/11/88	11/25/88	11/11/88	11/25/88
39	PREPARE/ RELEASE BAFO	10	11/11/88	11/25/88	11/11/88	11/25/88
40	RECEIVE COMMENTS FROM CC01	5	11/25/88	12/2/88	11/25/88	12/2/88
41	RECEIVE COMMENTS FROM AP01	5	11/25/88	12/2/88	11/25/88	12/2/88
42	DELIVER REPORT/CHARTS	5	12/2/88	12/9/88	12/2/88	12/9/88
43	PRESENTATION TO ADVISORY	3	12/9/88	12/14/88	12/9/88	12/14/88
44	DELIVER REPORT/CHARTS	3	12/14/88	12/19/88	12/14/88	12/19/88
45	PRESENTATION TO DA01	4	12/19/88	12/23/88	12/19/88	12/23/88
46	DELIVER REPORTS/CHARTS TO HQ	3	12/23/88	12/28/88	12/23/88	12/28/88
47	DRY RUN HQ PRESENTATION	5	12/28/88	1/4/89	12/28/88	1/4/89
48	FORMAL PRESENTATION TO	2	1/4/89	1/6/89	1/4/89	1/6/89
49	SOURCE SELECTION	0	1/6/89	1/6/89	1/6/89	1/6/89
50	NOTICE TO OFFERERS	0	1/6/89	1/6/89	1/6/89	1/6/89
51	DEVELOP PRE-NOGOTIATION	8	1/6/89	1/18/89	1/6/89	1/18/89
52	EXECUTE NEGOTIATIONS	4	1/18/89	1/24/89	1/18/89	1/24/89
53	REVIEW OF CONTRACT	3	1/24/89	1/27/89	1/24/89	1/27/89
54	CONTRACT AWARD	6	1/27/89	2/6/89	1/27/89	2/6/89
55	DEBRIEFINGS	8	1/6/89	1/18/89	1/6/89	1/18/89
56	ATP	0	1/27/89	1/27/89	1/27/89	1/27/89
57	CONTRACT PERIOD OF	100	1/27/89	6/16/89	1/27/89	6/16/89

Project Table for Full & Open Competition Requiring SEB (Phase B Studies)

Task Name	Days	Earliest Start	Earliest Finish	Latest Start	Latest Finish
1 GO-AHEAD ON OPEN COMPETITION	0	1/1/88	1/1/88	1/1/88	1/1/88
2 PREPARE INITIAL SOW DEFINITION	10	1/1/88	1/15/88	1/1/88	1/15/88
3 PREPARE PIA/RFP SOW FIRST DRAFT	40	1/15/88	3/11/88	1/22/88	3/18/88
4 PREPARE MASTER BUY PLAN	5	1/15/88	1/22/88	1/15/88	1/22/88
5 HOLD BUSINESS STRATEGY MEETING AT HQ	5	1/15/88	1/22/88	2/24/88	3/2/88
6 PREPARE PROCUREMENT PLAN/SEB LETTER	10	1/22/88	2/5/88	1/22/88	2/5/88
7 EVALUATION PLAN/RFP FINALIZED	18	3/11/88	4/6/88	3/18/88	4/13/88
8 PREPARE DRAFT CBD SYNOPSIS AND FORWARD TO PROCUREMENT (AP103)	10	1/1/88	1/15/88	4/4/88	4/18/88
9 HOLD PRE-DEVELOPMENT REVIEW NO.1 AT PROJECT LEVEL	5	3/11/88	3/18/88	3/23/88	3/30/88
10 PREPARE MISSION NEED STATEMENT AND FORWARD TO HQ	10	1/22/88	2/5/88	2/5/88	2/19/88
11 MASTER BUY PLAN MSFC APPROVAL	10	1/22/88	2/5/88	2/5/88	2/19/88
12 PROCUREMENT PLAN/SEB LETTER MSFC APPROVAL	10	2/5/88	2/19/88	2/5/88	2/19/88
13 CBD SYNOPSIS SENT TO CBD	0	1/15/88	1/15/88	4/18/88	4/18/88
14 OBTAIN AUTHORITY TO INITIATE INDUSTRY COORDINATION	0	1/22/88	1/22/88	3/2/88	3/2/88
15 HOLD PRE-DEVELOPMENT REVIEW NO.1 AT MSFC LEVEL	5	3/18/88	3/25/88	3/30/88	4/6/88
16 PRESENT PIA/RFP SOW TO MSFC ADVISORY COUNCIL	5	4/6/88	4/13/88	4/13/88	4/20/88
17 MISSION NEED STATEMENT HQ APPROVAL	23	2/5/88	3/9/88	2/19/88	3/23/88
18 PROCUREMENT PLAN/SEB LETTER HQ APPROVAL	23	2/19/88	3/23/88	2/19/88	3/23/88
19 MASTER BUY PLAN HQ APPROVAL	23	2/5/88	3/9/88	2/19/88	3/23/88
20 CBD SYNOPSIS PUBLISHED	23	1/15/88	2/17/88	4/18/88	5/19/88
21 PRELIMINARY PROJECT INTIATION	10	3/25/88	4/8/88	4/6/88	4/20/88
22 PREPARE AND HOLD INDUSTRY BRIEFING	15	1/22/88	2/12/88	3/2/88	3/23/88
23 PRESENT PIA/RFP SOW TO DA01	8	4/13/88	4/25/88	4/20/88	5/2/88
24 TWO WEEK NOTICE PERIOD IN CBD	10	2/17/88	3/2/88	5/19/88	6/2/88
25 SEB REVIEW/UPDATE OF PIA/RFP SOW TO FINAL FORM	28	3/23/88	5/2/88	3/23/88	5/2/88
26 HQ APPROVAL OF PIA/RFP SOW	23	5/2/88	6/2/88	5/2/88	6/2/88
27 RFP RELEASE	30	6/2/88	7/14/88	6/2/88	7/14/88
28 RECEIVE PROPOSALS	0	7/14/88	7/14/88	7/14/88	7/14/88
29 INITIAL EVALUATION	23	7/14/88	8/16/88	7/14/88	8/16/88
30 PREPARE COMPETITIVE RANGE & QUESTIONS	23	8/16/88	9/16/88	8/16/88	9/16/88
31 COMMENTS ON COMP. RANGE & QUES. FROM AP01	3	9/16/88	9/21/88	9/16/88	9/21/88
32 COMMENTS ON COMP. RANGE & QUES. FROM CC01	3	9/16/88	9/21/88	9/16/88	9/21/88
33 PREPARE AND SEND CHARTS TO MSFC ADVISORY COUNCIL	1	9/21/88	9/22/88	9/21/88	9/22/88
34 COMPETIVE RANGE PRESENTATION TO MSFC ADVISORY COUNCIL	5	9/22/88	9/29/88	9/22/88	9/29/88
35 NOTICE TO OFFERORS	1	9/29/88	9/30/88	9/29/88	9/30/88
36 WRITTEN AND ORAL RESPONSES TO QUESTIONS	15	9/30/88	10/21/88	9/30/88	10/21/88
37 RECEIVE BAFO OFFERS	5	10/21/88	10/28/88	10/21/88	10/28/88
38 BAFO EVALUATION	10	10/28/88	11/11/88	10/28/88	11/11/88
39 PREPARE/ RELEASE BAFO FINDINGS					

	REPORT TO CC01	10	11/11/88	11/25/88	11/11/88	11/25/88
40	PREPARE/ RELEASE BAFO FINDINGS REPORT TO AP01	10	11/11/88	11/11/88	11/25/88	11/11/88
41	RECEIVE COMMENTS FROM CC01	5	11/25/88	12/2/88	11/25/88	12/2/88
42	RECEIVE COMMENTS FROM AP01	5	11/25/88	12/2/88	11/25/88	12/2/88
43	DELIVER REPORT/CHARTS FINDINGS TO MSFC ADVISORY CO 2VES			12/2/88	12/9/88	12/2/88
44	PRESENTATION TO ADVISORY COUNCIL	3	12/9/88	12/14/88	12/9/88	12/14/88
45	DELIVER REPORT/CHARTS FINDINGS TO DA01	3	12/14/88	12/19/88	12/14/88	12/19/88
46	PRESENTATION TO DA01	4	12/19/88	12/23/88	12/19/88	12/23/88
47	DELIVER REPORTS/CHARTS (HQ	3	12/23/88	12/28/88	12/23/88	12/28/88
48	DRY RUN HQ PRESENTATION	5	12/28/88	1/4/89	12/28/88	1/4/89
49	FORMAL PRESENTATION TO SOURCE SELECTION OFFICIAL			2	1/4/89	1/6/89
50	SOURCE SELECTION	0	1/6/89	1/6/89	1/6/89	1/6/89
51	NOTICE TO OFFERERS	0	1/6/89	1/6/89	1/6/89	1/6/89
52	DEVELOP PRE-NEGOTIATION POSITION APPROACH	8		1/6/89	1/18/89	1/6/89
53	EXECUTE NEGOTIATIONS	4	1/18/89	1/24/89	1/18/89	1/24/89
54	REVIEW OF CONTRACT DOCUMENT	3	1/24/89	1/27/89	1/24/89	1/27/89
55	ATP	0	1/27/89	1/27/89	1/27/89	1/27/89
56	CONTRACT PERIOD OF PERFORMANCE	100	1/27/89	6/16/89	1/27/89	6/16/89
57	DEBRIEFINGS	8	1/6/89	1/18/89	1/6/89	1/18/89
58	CONTRACT AWARD	6	1/27/89	2/6/89	1/27/89	2/6/89

APPENDIX B
IO USER SURVEY FORMS

Interactive Office Problem Submittal

Name of SRS Technical Supporter:

Name of NASA IO User:

Date:

Problem:

Suggestions(and by whom):

Solution:

Comments:

Date Problem Solved and Closed:

APPENDIX C
MacRTOP Version 2.0
USER'S GUIDE

MacRTOP2.0
User's Guide

Version 2.0

February 5, 1990

for

Advanced Program Development
Office of Space Flight

National Aeronautics & Space Administration

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Foreword

This document and the accompanying software was prepared under contract NASW-4341 "Technical Assistance, Planning and Analysis," Task Order Number 6 "Program Management," for Advanced Program Development of the Office of Space Flight at NASA Headquarters. The NASA Contracting Officer's Technical Representative is Pat Conner. The NASA project technical leadership was provided by a NASA configuration control board co-chaired by Pat Conner and Chuck Holliman. The SRS contract manager is Dr. Rod Johnson of SRS Washington Operations Division. The SRS task leader is Timothy N. Deaton of the SRS Systems Technology Group in Huntsville, Alabama. Other contributors at SRS included:

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MacRTOP2.0

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Chapter I. - About MacRTOP

MacRTOP is a specialized database for NASA Research and Technology Operating Plan (RTOP) preparation written as a stand-alone Apple Macintosh™ 4th Dimension™ application. 4th Dimension™ is a relational database for the Macintosh.

The basic goal of SRS Technologies' MacRTOP application is to provide an environment for entering detailed RTOP information onto forms designed to closely resemble standard NASA RTOP forms and work sheets.

It is assumed that you are familiar with the basic operation of your Macintosh computer and its operating system. If the computer is new to you or if you are unfamiliar with such terms as "command keys," "clicking," "double-clicking," "dragging," "selecting," "windows," and "menus," you should read the Macintosh owner's guide before attempting to use MacRTOP.

This MacRTOP User's Guide provides information needed in order to prepare a working environment for the application. Those users who are familiar with previous versions of MacRTOP should still review this guide since version 2.0 of MacRTOP is based on the upgraded version 2.0 of 4th Dimension. Look for changes in installation, menus and buttons, and import/export functions in particular. Hardware and software that is needed to utilize the MacRTOP application is listed. The User's Guide also provides guidance in specific areas for the daily maintenance and operation of the MacRTOP program and handling of the information which will be contained in the database.

Included in the package you received were this MacRTOP2.0 User's Guide and two (2) double-sided (800K) Macintosh diskettes. The MacRTOP2.0 Disk contains the MacRTOP2.0 application file and other utility files you will double-click to start the program. The second disk contains 4th Dimension Runtime version 2.0 and some 4th Dimension utilities which are used by MacRTOP2.0 during program execution. 4D Runtime version 2.0 will not allow you to design and construct other databases, but simply allows you to run the MacRTOP2.0 database application. Appendix A contains a copy of the 4D version 2.0 Runtime manual for reference. It is recommended that you immediately lock both the original MacRTOP2.0 disk and the 4D version 2.0 Runtime™ disk to prevent accidental damage. Slide the small square button in the corner of the diskettes so that the tiny window is open. This prevents the disks from being written over.

Neither the MacRTOP2.0 disk nor the 4th Dimension Runtime disk is copy protected. We encourage you to make working copies of the disks for your own protection. The material on the disks is copyrighted, and they are not to be further copied or duplicated, except for archival purposes by authorized NASA personnel. Before using the program, make one copy of each original disk. Use these copies as your working copies, and put the original disks in a safe place

Chapter II. - Installation and Startup

A. Hardware Requirements

MacRTOP2.0 was designed specifically to run on the Apple Macintosh family of personal computers. The unique and powerful user interface features of the Macintosh have been used extensively. As a result MacRTOP2.0 cannot be executed on other PC's or larger machines. The recommended hardware configuration is:

- A Macintosh Plus, Mac SE, or Mac II computer with at least 1 megabyte of RAM.
- A floppy drive and a hard disk mass storage unit (fixed or removable).
- At least two (2) blank disks. You will use these to make working copies of your original MacRTOP2.0 disks.
- A LaserWriter II or LaserWriter II-NTX printer.

The MacRTOP2.0 application was developed primarily on a Macintosh IIcx with 4 Mbytes of RAM, a 40 Mbyte internal hard disk drive running System software release 6.0.3, and a full page gray scale monitor. The application was tested on a Macintosh SE system with a hard disk drive. These systems were connected through an AppleTalk LAN to a LaserWriter II executing Appleshare 2.0.1. MacRTOP2.0 is fully compatible with AppleTalk networks, AppleShare file server configurations, and VAX ALISAShare file servers (see C. Installation Instructions later in this chapter). An extended keyboard is not necessary, but may be used with no reduction of functionality. It is possible to execute MacRTOP using an external 800K drive instead of the hard disk, but execution speed is slower, and for a large number of RTOPs it may become difficult to avoid tedious disk swapping. Note: floppy-based system users may have to construct a "Minimal System" on their startup disk to have space for both the required system resources and the 4D Runtime application. See your Macintosh System Manager or your Apple Dealer for instructions on this process.

For electronic transfer of the finalized RTOPs a Hayes-compatible modem is recommended with a capability of, at least, 2400 baud.

B. Software Requirements

MacRTOP2.0 utilizes several special fonts and system utilities available for the Macintosh computer. To successfully use the application, use Apple's Macintosh System release 6.0.3 (with System version 6.0.3, Finder version 6.1, LaserWriter version 5.2 and Laser Prep version 5.2). All these resources are located in the System Folder of either the hard disk drive on your

2. Copy MacRTOP and Runtime Files into Folder

Insert Disk 1 - MacRTOP2.0 Disk into the floppy drive and its contents will appear. Choose Select All from the Edit menu and all of the files on the MacRTOP2.0 disk will highlight. You can now drag them all into the MacRTOP2.0 Data folder on your hard disk. Eject Disk 1 - MacRTOP2.0 Disk by dragging its icon into the trash.

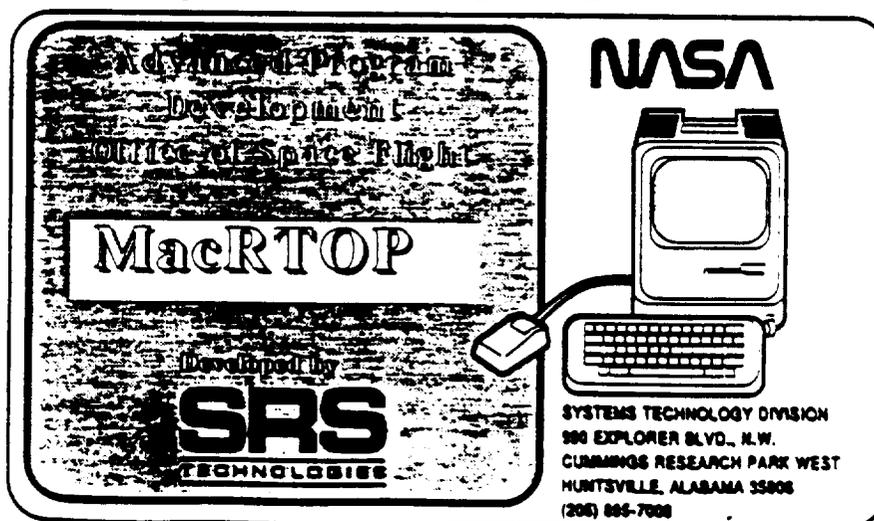
Insert Disk 2 - 4D Runtime. Choose Select All from the Edit menu and copy the files by dragging them into the MacRTOP2.0 Data folder on your hard disk. Eject Disk 2 - 4D Runtime by dragging its icon into the trash.

Hard Disk Installation - File Server System

To utilize a Macintosh File Server system (either AppleShare or ALISAShare), follow the procedure for a single-user hard disk installation, installing all files locally at the outset. Do not install or copy the 4D Runtime application onto the File Server. 4D Runtime must be resident on the Macintosh on which you are working(see copyright restrictions in Appendix A). It is possible to work with MacRTOP2.0 from any Macintosh computer on the network with access to the File Server, using the shared File Server volume to guarantee one centrally accessible database of RTOP information. It is strongly recommended that you contact the MacRTOP2.0 Help services(see Chapter IX) for guidance on the best methods and procedures to use.

D. Startup

As with most Macintosh applications, MacRTOP2.0 may be started in two ways. One way is to select the MacRTOP2.0 icon by clicking on it. The icon will become highlighted to indicate it has been selected. Choose Open from the File menu and the program will start up. Alternatively, double-clicking on the MacRTOP2.0 icon will cause the program to start up. MacRTOP2.0 displays a 4th Dimension introduction screen and then requests a user password (see Chapter III.). After successful entry of the password, the following screen greets the user.

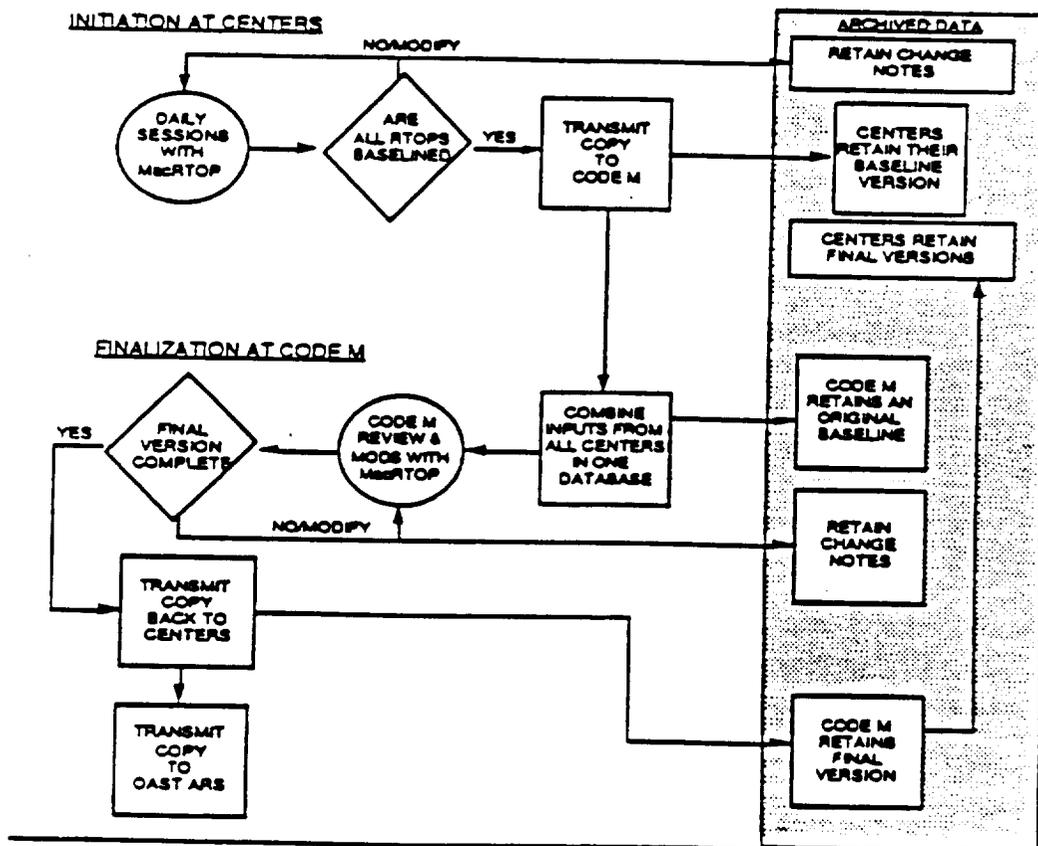


Chapter III. - MacRTOP2.0 General Operations

A. Saving Files

It is recommended that the user make a back-up copy of the disks as received, periodically throughout the process of creating and modifying them, and finally, after baselining (attachment of signatures) and prior to transmittal to NASA Headquarters. The most secure, and perhaps simplest method, is to insert a blank disk and copy the MacRTOP2.0 folder and all its contents. Note the date and then store the disk in a safe and secure place. In addition, when a user makes the modifications with MacRTOP2.0, a request is made for the user to provide a summary notation about the changes. This change log is maintained as part of the database and serves as an additional audit trail.

The following figure shows a flow diagram of the RTOP creation and distribution process when MacRTOP2.0 is used. You should refer to this diagram during the RTOP entry and approval process to ensure that proper file archiving of data has been performed.



completeness or clarity, but does not permit either modification, signature input or original creation authority (Add Records).

A sealed envelope has been included in the MacRTOP2.0 distribution package. This envelope contains NASA Center-specific passwords for MacRTOP2.0 usage and should be opened by a cognizant RTOP system user. A password *must* be entered before activation of the MacRTOP2.0 application. *CAUTION: DO NOT MISPLACE YOUR PASSWORD LIST.* If for any reason you are unable to access MacRTOP2.0 because of password entry problems, contact Terri Nabors at SRS Technologies (205 895-7039). She will be able to assist you.

C. Signatures

MacRTOP is a truly paperless office management tool. The signatures at the bottoms of the forms can be automatically filled with an electronic image of a signature which is stored just like any other data item in the data base. Control of the center signatures password will protect access to and use of the signatures. Each center individual designated to input signatures is responsible for control and security of this password. A handwritten signature must be run through an optical scanner to produce an electronic image. A facility already exists in MacRTOP to accept and protect it from users below the center signatures password level. If you do not have your appropriate signatures scanned call one of the HELP telephone numbers (see Chapter IV) for more instructions.

D. Getting Started

First, open the MacRTOP2.0 Folder and double-click on the 4D Application Icon with the name MacRTOP2.0. Immediately, a request for the user level and password is made. Select the appropriate level, type in the password associated with that user level and press Return. You will begin by adding your first RTOP by choosing, from the **RTOP Edit** menu bar above the screen, the **RTOP Edit & Entry** item. This path enables the user to add new RTOP's, complete partially finished forms or make corrections to existing ones. The icons at the bottom of the screen are self-explanatory. If needed, additional explanations are given in chapter IV. For instructions on importing previous RTOPs from earlier MacRTOP versions, see chapter VI.

The following figure provides several general notes about MacRTOP2.0 usage. On-line Help screens are available to the user in a top-level Help menu. Chapter IX discusses these screens in detail and provides complete printouts of the information available in these screens.

MacRTOP2.0 allows for three methods of moving between fields of each form within the RTOP set. The RETURN or TAB key can be used to move from field to field or the mouse can be used to control the cursor. After data entry in a particular field, a single click of the mouse on the next field will enter the data in the previous field and allow for data entry in the newly-selected

Chapter IV. - RTOP Edit

Because much of the same information can be found at the top of each RTOP form and because a single RTOP contains a number of forms, an initial entry CATALOG Form is used for entering this repetitive information and distributing it to all of the forms for that RTOP. The Catalog Form serves two purposes: (1) to enter/display frequently-referenced RTOP information (i.e., RTOP Title, UPN, Performing Organization, etc.); and (2) to traverse the lower-level linked forms (i.e., 1588 Task Resumé, and 1471a Continuation Form).

The following sections describe each form and indicate which blocks of the form are automatically filled and which must be input. Some fields may have already been entered in through the Catalog Form or another form or they are calculated from other data that is entered. As an RTOP is prepared, it will be obvious which fields already have information passed or calculated from other forms.

There are some basic button uses throughout each RTOP listing and are shown and described below.

MacRTOP2.0 Buttons



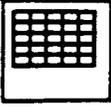
Add Record

Add new RTOP to the database. Will give a new blank RTOP entry after every ACCEPT.



Search

Quick Search(on left) will give a box to choose keywords from the set of most frequently used variables. The Search on the right will give a standard 4-D search window where more detailed searched can be performed.(any field in the database can be searched on)

**Export to Spreadsheet**

Export to Spreadsheet will export the current selection of RTOPs to a spreadsheet format for manipulation.

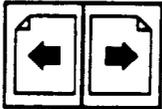
**Delete**

The user must be logged in under the correct user name to have access to RTOP deletion. To delete an RTOP from the database, highlight the RTOP(s) to be deleted with the shift/mouse click method and then select the delete button at the bottom of the screen. The total number of RTOPs being deleted will be displayed. If OK is selected on the confirmation window, the RTOPs highlighted and its associated forms will be deleted and cannot be recovered.

Accept**Cancel**

Accept will save all data changes made in the current session.

Cancel will negate any changes made in the current session.

**Page**

The paging buttons will advance or backup to the following or previous page.

**Catalog
Form**

The catalog form button will make the current page the catalog form.

B. RTOP Edit & Entry

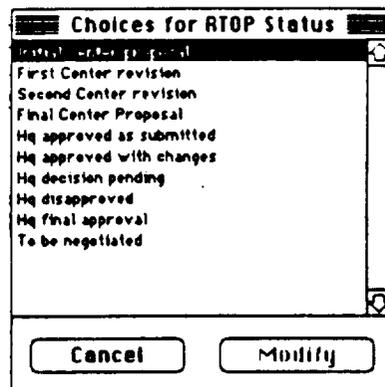
To edit an RTOP double-click on the appropriate RTOP. To Add an RTOP click on the Add Record button. When editing or adding an RTOP there is a delay time between double-clicking on the line and the display of the RTOP. This delay is due to recording loading time and will vary according to your machines memory capacity. Every time you enter a form in the RTOP Edit & Entry mode, a request is displayed for comments or change justifications. You may include any relevant information to this RTOP, notes to yourself or notes to someone reviewing the particular RTOP. This facility is provided for the user's benefit as a method of holding information that is not pertinent to the database and will not be printed or used in the individual forms.

1. Catalog Form

The Catalog Form, shown below, is the beginning point for the edit or entry of data. In the box to the right of **Title**, enter the title of the RTOP. To change any field with data already existing in the field, highlight the full field with the cursor and type the new entry or click the cursor in the area where changes are needed and insert characters by typing or delete characters by hitting the delete button with the cursor behind the character to be deleted. Click the mouse into another field or press RETURN (or TAB) after entering a field and the next box below will be highlighted for entry or a selection box will be displayed. At any time during the edit or entry session the user can **CANCEL** which will negate all work done in the current session or **ACCEPT** will store the information in the data base. (NOTE: BE CAREFUL WHEN USING THE CANCEL BUTTON - IF THE USER IS ADDING A NEW RECORD, THIS RECORD WILL NOT BE SAVED. IF THE USER IS EDITING AN EXISTING RTOP ANY CHANGES MADE SINCE THE ORIGINAL ENTRY TO THE RTOP FROM THE LISTINGS MODE WILL NOT BE SAVED AND CANNOT BE RETREIVED.)

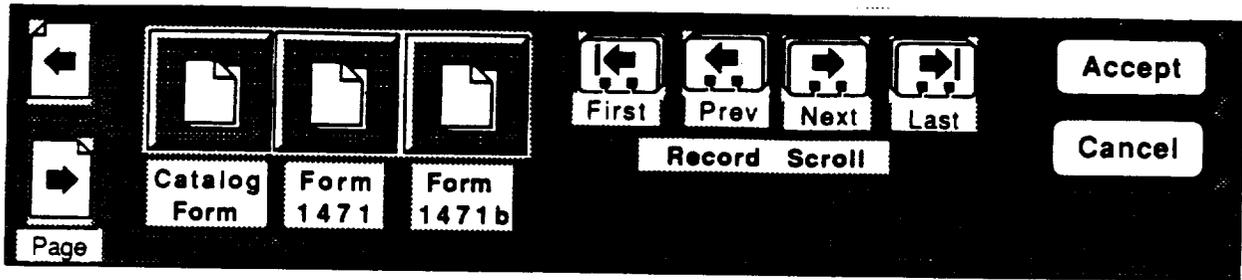
number selection menu will be a WBS number. Click on the WBS number displayed to fill it in the WBS Number entry box on the catalog form. The Cancel button on the menu selection box can be selected at any time during the selection process and will return you to the catalog form with the WBS box remaining empty or the previous WBS number (if there was one) re-envolked. The respective UPN field will automatically be entered according to the WBS number entry.

Menu selections will be displayed when entering the **Center** and **City,State,Zip** boxes in the Point of Contact entry area. Click once on the appropriate entry for your center. The **Guideline** entry box will display a menu selection of *In Guideline* or *Over Guideline*. Select the guideline appropriate for this RTOP. The Status entry box displays a menu selection for the current status of the RTOP. Shown below is the menu selection of acceptable status choices. Centers will not have the capability to enter headquarter status choices. Please select the appropriate status for this RTOP.



Chapter IX gives a reproduction of the HELP information for the Catalog Form which will help you understand the information required and format of data entry required for this form.

Having entered the header information, it is now time to go to the forms themselves to complete them. Click on the appropriate button containing the form number you wish to fill next or use the page arrows to advance forward. All buttons except Form 1471a & 1588 button will display the appropriate form for entry. Form 1471a & 1588 will give 2 lined boxes, one for Form 1471a form entries and one for form 1588 entries. These two forms are special in that they can have more than one entry for that form (i.e more than one continuation form and more than one Task Resume). The entry overview form for 1471a and 1588 is shown on the next page. It is recommended that the user enter the forms in the following order: (1) 1471 Summary Form (2) 1471a Continuation Form (3) 1588 Resume Form (4) 1471b Resource and Funds Form. This order is recommended because some information in later forms is drawn from data input in



Double click on the next blank line for a new form.

Continuation Form 1471a

Form1471a

1471a Control Buttons

Add

Modify

Resume task Form 1588

Form1588

1588 Control Buttons

Add

Modify

3. Form 1471a - Continuation

Form 1471a provides the capability to continue the contents of block 11, Brief Technical Summary of Form 1471. Alternately you can view this as a way of segmenting block 11 into specific topics or continuing any Resume form 1588 task description. On 1471 put a paragraph describing the RTOP and then on 1471a, discuss the topics of Justification, Objectives and Plans, and Review and Reporting. You may use as many continuation pages as you need. To begin a new continuation form, select the 1471a Add button or double-click on the next blank line to display a new empty continuation form and enter new data. Click on **ACCEPT** (or hit the **Enter** key) to save the current continuation form and return to the line listing to add the next continuation form. (This **ACCEPT** button will not be effective unless an **ACCEPT** button at the lower level is selected.) Highlight (or click in the area) a 1471a line item and select the **Modify** button or double-click on the line item to modify a current 1471a form.

a. Deleting Form 1471a - Continuation

The case may present itself in which you have entered a Continuation associated with an RTOP which you would like to delete, keeping all other Continuation forms. The user must be in the RTOP Edit & Entry mode in order to delete a Continuation Form 1471a. When in the edit mode, click once on the 1471a button. The titles of all the Continuation forms are listed and can be scrolled through with the scroll bar. Find the Continuation Form you wish to delete and click the cursor somewhere on that line, then go to the menu and select **Delete Current Continuation** under the **Delete Forms** menu selection. A confirmation box will be displayed and the Continuation Form will be deleted if **OK** is selected. However, if at the end of your modify session you decide you did not want to delete a Continuation Form already confirmed as deleted, just select **Cancel** in the catalog form and the Continuation form will be restored. (NOTE: If **CANCEL** is selected to restore a Continuation form, all changes made in that edit session will be canceled also.)

When you are finished with this form, continue on to the 1588 Form which is accessed through the blank lines below the 1471a line entries or click on the appropriate form button.

Chapter IX gives a reproduction of the **HELP** information for the Objectives 1471a Form which will help you understand the information required and format of data entry required for this form.

4. Form 1588 - Task Resumé

Each RTOP may be planned to occur in programmatic segments or tasks. MacRTOP2.0 provides the capability to complete a Form 1588 for each of these. The summary data provided in this form for cost will be combined with the same information from all the other tasks under this RTOP number and displayed in Forms 1471b Funding & Resources. It should be noted that this form is not part of the OAST RTOP system, if you elect to use this system.

To begin a new Resume form, select the 1588 Add button or double-click on the next blank line in the 1588 line item display to display a new empty Resume form and enter new data. Click on **ACCEPT** (or hit the **Enter** key) to save the current Resume form and return to the line listing to add the next Resume form. (This **ACCEPT** button will not be effective unless an **ACCEPT** button at the lower level is selected.) Highlight (or click in the area) a 1588 line item and select the **Modify** button or double-click on the line item to modify a current 1588 form.

Blocks 10, 11, and 12 are the manpower and funding information blocks. Column b, c, and f are the only enterable blocks with d and e blocks being calculated from the IMS rates (see a below). The catalog form's Current RTOP FY field corresponds with the current FY in column "d" and in all forms with an FY display. The IMS rates are entered in the **IMS Rate** menu at the top of Form 1588. The IMS default is 0 for each year if not modified. Form 1588 column "d" is automatically calculated by multiplying the IMS Rate times the In-House Manpower (column "b"). Column "f" in Form 1588 is the Funding Total. Column "e" on 1588 is automatically calculated by subtracting column "d" (IMS) from column "f" (TOTAL).

a. IMS Rates

As required on Form 1588 Task Resumé, Institutional Management System (IMS) Rates must be entered to calculate 1588 Task Resumé and 1471b Funding dollar amounts correctly. To facilitate proper calculation of funding amounts, MacRTOP2.0 provides a menu choice to set these IMS rates according to guidelines specific to each NASA Center. This menu, **IMS Rates**, is seen at the top of Form 1588 and should be entered before funding information is entered. When you choose this menu item, the display shown below appears on the screen. Fill in proper amounts for each fiscal year listed (**Prior, Actual, Budget, and Budget+1**). Once the rates have been entered, click the **Accept** button to save the data and exit the screen.

Accept Current 1588

Cancel Current 1588



Research and Technology Resume

1. TITLE Task Title		2. DATE PREPARED VDATE				
3. PERFORMING ORGANIZATION VOrgan VOrgAdd VCity		4. START DATE a. QUARTER BOTR b. YEAR BYR				
		5. END DATE a. QUARTER EQTR b. YEAR EYR				
6. INVESTIGATOR'S NAME InvestName		TEL. NO. InvestPh	7. CONTRACT NUMBER Contract			
8. NASA ALT. TECH MONITOR'S NAME Monitor		TEL. NO. NonTelep	9a. UPN VCode 9. INSTIT. CATGY & CODE Category			
FISCAL YEAR 80	STATUS a.	MANPOWER (MY)		FUNDING (In K)		
		IN-HOUSE b.	S/C c.	IMS d.	R/D e.	TOTAL f.
10. PRIOR	FY <input checked="" type="checkbox"/>	10b	10c	10d	10e	10f
11. CURRENT	FY <input checked="" type="checkbox"/>	11b	11c	11d	11e	11f
12. BUDGET	FY <input checked="" type="checkbox"/>	12b	12c	12d	12e	12f
	FY <input checked="" type="checkbox"/>	12b2	12c2	12d2	12e2	12f2
13. DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; and c. What will be accomplished this year.)						
Description						

TECHNICAL MONITOR	TYPED NAME AND SIGNATURE TechMon	TechSign	DATE TMDate
APPROVING OFFICIAL	TYPED NAME AND SIGNATURE Approve	AppSign	DATE AODate

NASA Form 1588 MAR 81 REPLACES NASA FORM T43 WHICH MAY BE USED (ELECTRONICALLY GENERATED) (SHEET 2)

Accept Current 1588

Cancel Current 1588

<u>Code</u>	<u>Name</u>	<u>Entry Method</u>
I.	Human Resources(workyears)	
A.	NASA Direct Civil Service	
	Direct Professional	User Input
	Direct Support	User Input
	Total	I.A(Direct Professional) + I.B(Direct Support)
B.	Other	
	Other Govt Agency	User Input
	Total	Entry from I.B
C.	Contractor Support Workyears	Automatic sum Form 1588(c)
	Total Workyears	Sum I.A+I.B+I.C
II.	R&D Funds	
A.	Out-of-House	Sum Form 1588(f)-II.B
B.	In-House	II.B(1)+II.B(2)+II.B(3)
(1)	Direct Program	User Input
(2)	Direct Program Support	User Input
(3)	Multiprogram Support	
	(NASA Dir. Civ. Serv. WYE x Ctr. wide Rate)	Automatic sum Form 1588(d)
	Approved Ctr.-wide Rate/Workyear of Effort (WYE)	Automatic IMS Rate from Form 1588
	Total R&D Funds	II.A + II.B

Page

Catalog Form

Form 1471

Form 1471a & 1588

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Accept
Cancel

Record Scroll

NASA

DATE PREPARED

Research and Technology Objectives and Plans

CURRENT NUMBERCODE

16. RESOURCES REQUIREMENTS

Prior Actual Prior Est. Current
 FY FY FY FY FY

I. HUMAN RESOURCES (WORKYEARS)

A. NASA DIRECT CIVIL SERVICE

Direct Professional	<input type="text" value="PAIA1"/>	<input type="text" value=""/>	<input type="text" value="CUIA1"/>	<input type="text" value="CU2IA1"/>	<input type="text" value="CU3IA1"/>
Direct Support	<input type="text" value="PAIA2"/>	<input type="text" value=""/>	<input type="text" value="CUIA2"/>	<input type="text" value="CU2IA2"/>	<input type="text" value="CU3IA2"/>
Total	<input type="text" value="PAIA"/>	<input type="text" value=""/>	<input type="text" value="CUIA"/>	<input type="text" value="CU2IA"/>	<input type="text" value="CU3IA"/>

B. OTHER (See Instruct.)

Other Govt. Agency	<input type="text" value="PAIB"/>	<input type="text" value=""/>	<input type="text" value="CUIB"/>	<input type="text" value="CU2IB"/>	<input type="text" value="CU3IB"/>
Miscellaneous	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
Total	<input type="text" value="PAIB"/>	<input type="text" value=""/>	<input type="text" value="CUIB"/>	<input type="text" value="CU2IB"/>	<input type="text" value="CU3IB"/>

C. CONTRACTOR SUPPORT WORKYEARS
(In-House Dir. Prog. Only)*

<input type="text" value="PAIC"/>	<input type="text" value=""/>	<input type="text" value="CUC"/>	<input type="text" value="CU2IC"/>	<input type="text" value="CU3IC"/>
TOTAL WORKYEARS	<input type="text" value="WP200"/>	<input type="text" value=""/>	<input type="text" value="W000001"/>	<input type="text" value="W000000"/>

II. R&D FUNDS (\$K)

A. OUT-OF-HOUSE

<input type="text" value="PAIIA"/>	<input type="text" value=""/>	<input type="text" value="CUIIA"/>	<input type="text" value="CU2IIA"/>	<input type="text" value="CU3IIA"/>
------------------------------------	-------------------------------	------------------------------------	-------------------------------------	-------------------------------------

B. IN-HOUSE

(1) Direct Program	<input type="text" value="PAIIB1"/>	<input type="text" value=""/>	<input type="text" value="CUIB1"/>	<input type="text" value="CU2IIB1"/>	<input type="text" value="CU3IIB1"/>
(2) Direct Program Support	<input type="text" value="PAIIB2"/>	<input type="text" value=""/>	<input type="text" value="CUIB2"/>	<input type="text" value="CU2IIB2"/>	<input type="text" value="CU3IIB2"/>
-Fabrication					
-ADP Equipment					
-ADP Operations					
-Instrument Pool					
-Other (See Instruct.)					
(3) Multiprogram Support (NASA Dir. Civ. Serv. WYE x Ctr.-wide Rate)	<input type="text" value="PAIIB3"/>	<input type="text" value=""/>	<input type="text" value="CUIB3"/>	<input type="text" value="CU2IIB3"/>	<input type="text" value="CU3IIB3"/>
Approved Ctr.-wide Rate/ Workyear of Effort (WYE)	<input type="text" value="PAIIB3W"/>	<input type="text" value=""/>	<input type="text" value="CUIB3W"/>	<input type="text" value="CU2IIB3W"/>	<input type="text" value="CU3IIB3W"/>
TOTAL R&D FUNDS	<input type="text" value="WP200"/>	<input type="text" value=""/>	<input type="text" value="W000000"/>	<input type="text" value="W000000"/>	<input type="text" value="W000000"/>

III. CONTRACTS

	CONTRACT NO.	CONTRACTOR	CURRENT FY R&D \$,K	DIR. PROG WYE
A. OUT-OF-HOUSE	<input type="text" value="CNIIIA"/>	<input type="text" value="CRIIIA"/>	<input type="text" value="CFYIIIA"/>	N/A
B. IN-HOUSE DIR. PROG.	<input type="text" value="CNIIB"/>	<input type="text" value="CRIIB"/>	<input type="text" value="CFYIIB"/>	<input type="text" value="DPIIB"/>

A&R PERCENTAGE

NASA Form 1471B MAR 81 PREVIOUS EDITIONS ARE OBSOLETE (ELECTRONICALLY GENERATED) (SHEET 3)

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Catalog Form

Form 1471

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Accept
Cancel

Record Scroll

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MISSING
PRECEDING PAGE BLANK NOT FILLED

Chapter V. - Signatures

As stated in Chapter III., signature block text can be omitted from the signature blocks of either the Form 1471 Summary or Form 1588 Task Resumé Form without any sacrifice of MacRTOP2.0 functionality. The ability to enter signatures in an automated fashion is available in the system and can be implemented rapidly. Contact Timothy N. Deaton at SRS Technologies for further information in this area (205 895-7830).

A. Center Signatures

Summary Form - 1471 Signatures

There are four signatures in the Summary Form (1471) which consist of the following: Installation Concurrence, Installation Approval, Headquarter Concurrence, and Headquarter Approval. The Center Signatures user logon level will allow the user to input the Installation Concurrence and Installation Approval signatures only. Select the Center Signatures menu item under the Signatures menu when logged in under the correct user level. When access is gained select the Form 1471 button from the catalog form and cut and paste a scanned signature into the appropriate block. The signatures are also to be typed under the scanned signatures. Hit the return key to position the cursor under the signature block to type the authorized name. Signatures should be input for each Summary form associated with a particular RTOP. Selecting the print summary command will print the summary form with signatures. Only the headquarters office will have the ability to add the HQ Concurrence and Approval Signatures through the Headquarters Signatures menu. Selecting the print summary command will print the summary form with signatures.

B. Headquarters Signatures

Summary Form - 1471 Signatures

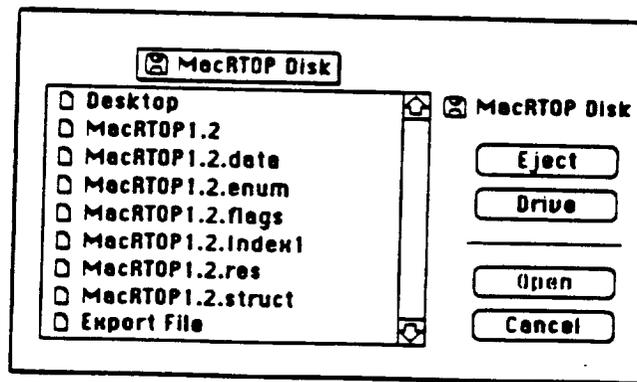
There are four signatures in the Summary Form (1471) which consist of the following: Installation Concurrence, Installation Approval, Headquarter Concurrence, and Headquarter Approval. The Headquarters Signatures user logon level will allow the user to input the Headquarter Concurrence and Headquarter Approval signatures. Select the Headquarters Signatures menu item under the Signatures menu when logged in under the correct user level. When access is gained select the Form 1471 button from the catalog form and cut and paste a scanned signature into the appropriate block. Center Signatures under the Signatures menu will

Chapter VI. - Import/Export

The current version of the MacRTOP program is version 2.0. This represents the new release of MacRTOP using new 4th Dimension version 2.0. It is not compatible with previous versions 1.0.6 or earlier. The user is advised to store their version 1.0.6 runtime diskettes and previous MacRTOP data diskettes to be used disjoint from any version 2.0 data. Runtime 1.0.6 will not open MacRTOP2.0 just as Runtime 2.0 will not open any MacRTOP1.X versions. If the user must import old version 1 data into version 2.0 please contact the Help Line. Separate data export and import features have been added to MacRTOP2.0 to allow users to transport just the MacRTOP2.0 data without having to include the full program with it. The next two sections of this chapter explain the data import and export routines of MacRTOP2.0.

A. Export Records From Database

If an upgraded version of MacRTOP2.0 is to be used after some RTOP data has been entered into the system or if you need to allow another authorized user to use some information from your RTOP database, you should make use of the **Export Data** feature of MacRTOP2.0. **Import/Export** is a top-level menu choice of MacRTOP2.0, seen when the program is first entered. To allow you to read your current data into a new database (whether a new release of MacRTOP or another user's database), you must first export the data to a separate data file. When you choose **Export** a data file from the **Import/Export** Menu, the dialog box shown below is presented to you. You must choose a name and target location for your new data file - the example uses a file called "Export File." Simply click the **SAVE** button and the data file will be written to the disk for you.



RTOP Comment Document

Originators Name:

Phone :

Center :

RTOP Number(s)
concerned with :

Questions/Problems/Comments

DocText

Chapter VII. - Reports

A. UPN Overview

The UPN Overview will give a listing of RTOPs and general information such as UPN number, title, center, point of contact and point of contacts phone number. The buttons provided can be used to manipulate the RTOP and get a broad view of the current RTOPs in the database.

B. Total R&D Funding by Task

The Total R&D Funding report gives a breakdown of each task for each RTOP and the total and individual funding information. A listing of RTOPs with control buttons will be displayed. Search for a specific set of RTOPs or double-click on an RTOP to display the funding information. The user can use the record scroll buttons to scroll through the RTOPs in the current selection.

C. Advanced Space Trans - WBS 1.0

The Advanced Space Transportation menu will give the total funding information of all RTOPs with a WBS number starting with 1. The funding information is broken down into programs and subprograms of each branch. Refer to the chart given in Appendix A for the WBS breakdown chart.

D. Advanced Operations - WBS 2.0

The Advanced Space Transportation menu will give the total funding information of all RTOPs with a WBS number starting with 2. The funding information is broken down into programs and subprograms of each branch. Refer to the chart given in Appendix A for the WBS breakdown chart.

E. Satellite Servicing - WBS 3.0

The Advanced Space Transportation menu will give the total funding information of all RTOPs with a WBS number starting with 3. The funding information is broken down into programs and subprograms of each branch. Refer to the chart given in Appendix A for the WBS breakdown chart.

F. Advanced Launch Systems - WBS 4.0

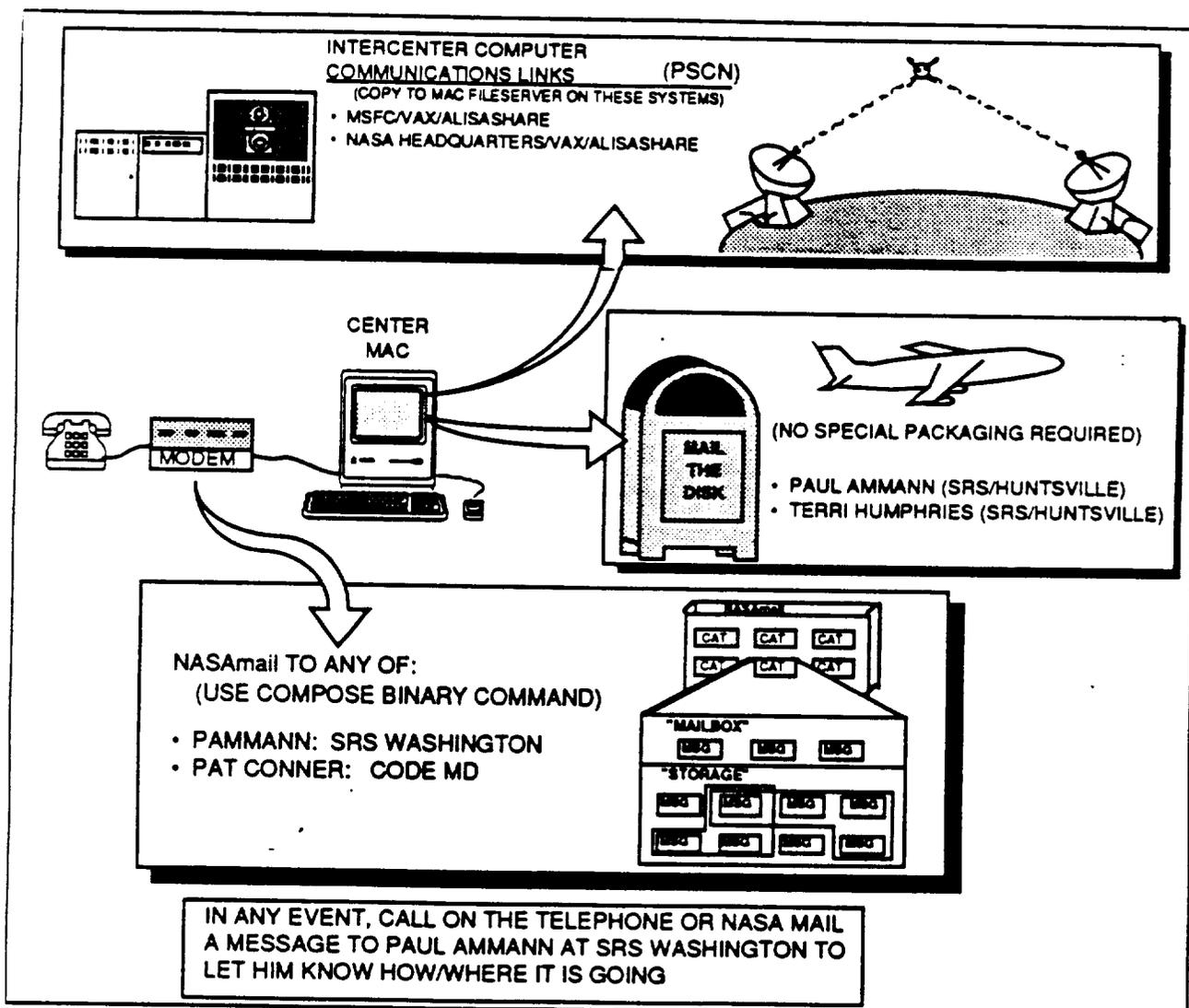
The Advanced Launch Systems menu will give the total funding information of all RTOPs with a WBS number starting with 4. The funding information is broken down into programs and subprograms of each branch. Refer to the chart given in Appendix A for the WBS breakdown chart.

G. WBS Structure

The WBS Structure menu will give a breakdown of the branch, program and subprogram of each RTOP. Refer to the chart given in Appendix A for the WBS breakdown chart.

Chapter VIII. - Transmit RTOPs

When the RTOPs have been signed-off at the centers and are ready for transmittal to Headquarters, a number of alternative methods are available. These are depicted and outlined below. The overall objective is to deliver a copy of your exported RTOP file to Code M (or SRS/Washington).



Chapter IX. - User Help Resources

A. On-line Help Information

Associated with each of the forms are some narrative descriptions of the information to be input to that form. These are available during a MacRTOP session from a pull-down menu at the top of the screen. These screens are presented in their entirety on the following pages.

B. Telephone Help Line

The user is encouraged to make use of the phone numbers and other information provided below. It may be necessary to rely on personal contact with the program developers to overcome certain obstacles. The following information is provided for you to use when you need such help:

Program Execution/Operation:

Terri H. Nabors
Telephone Number: (205) 895 -7085 or 7000
NASAmail code: SMONTGOMERY
Address:
SRS Technologies
990 Explorer Blvd. NW
Cummings Research Park West
Huntsville, AL 35806

Task Leader/Customer Interface:

Timothy N. Deaton
Telephone Number: (205) 895 -7830 or 7000
NASAmail code: SMONTGOMERY
Address:
SRS Technologies
990 Explorer Blvd. NW
Cummings Research Park West
Huntsville, AL 35806

SRS MacRTOP Representative in Washington D.C.

Paul Ammann
Telephone Number: (703) 522 -5588
NASAmail code: PAMMANN
Address:
SRS Technologies
1500 Wilson Blvd, Suite 800
Arlington, VA 22209

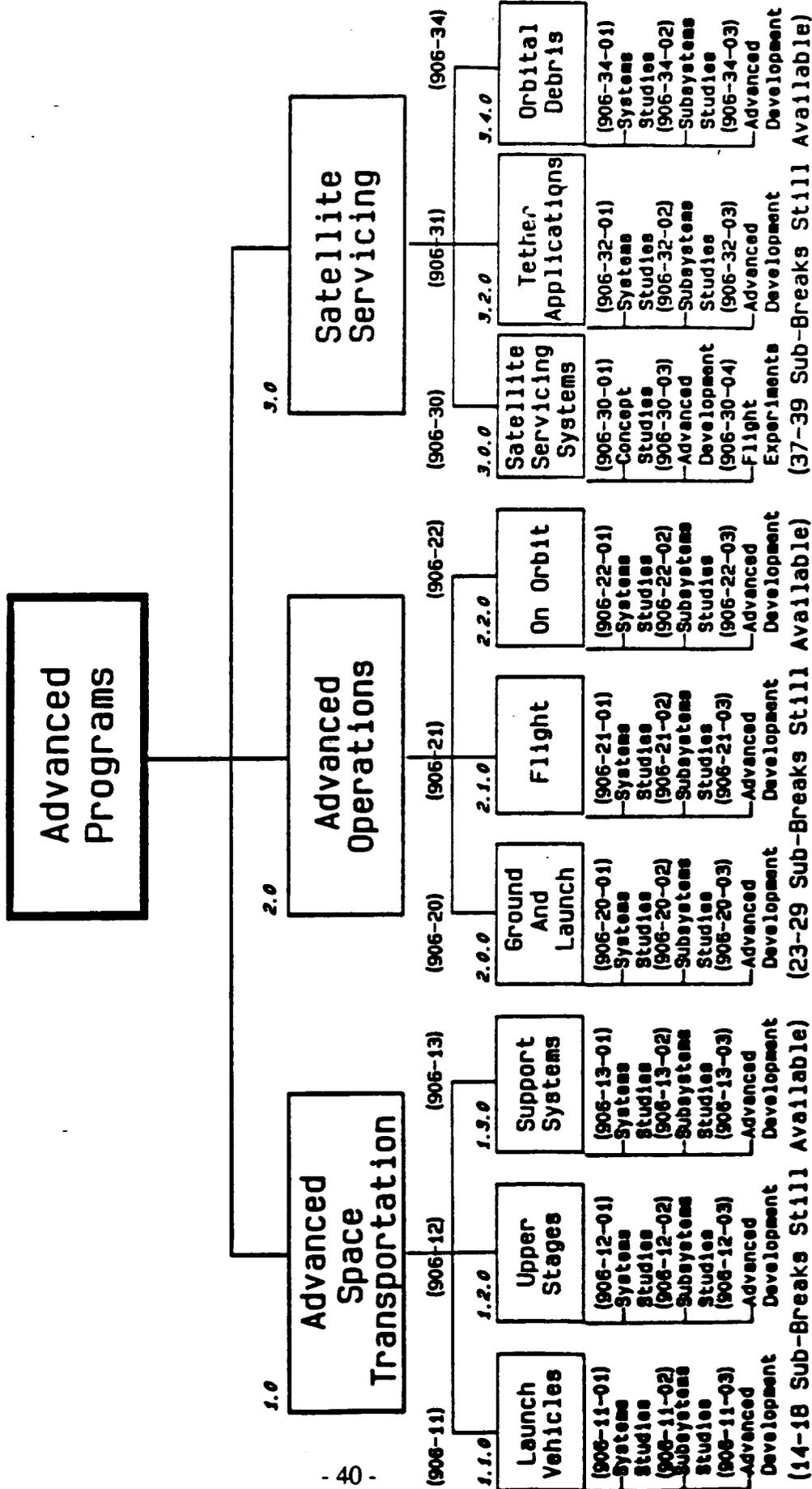
Appendix A
Work Breakdown Structure
Chart

ADVANCED PROGRAM DEVELOPMENT DIVISION

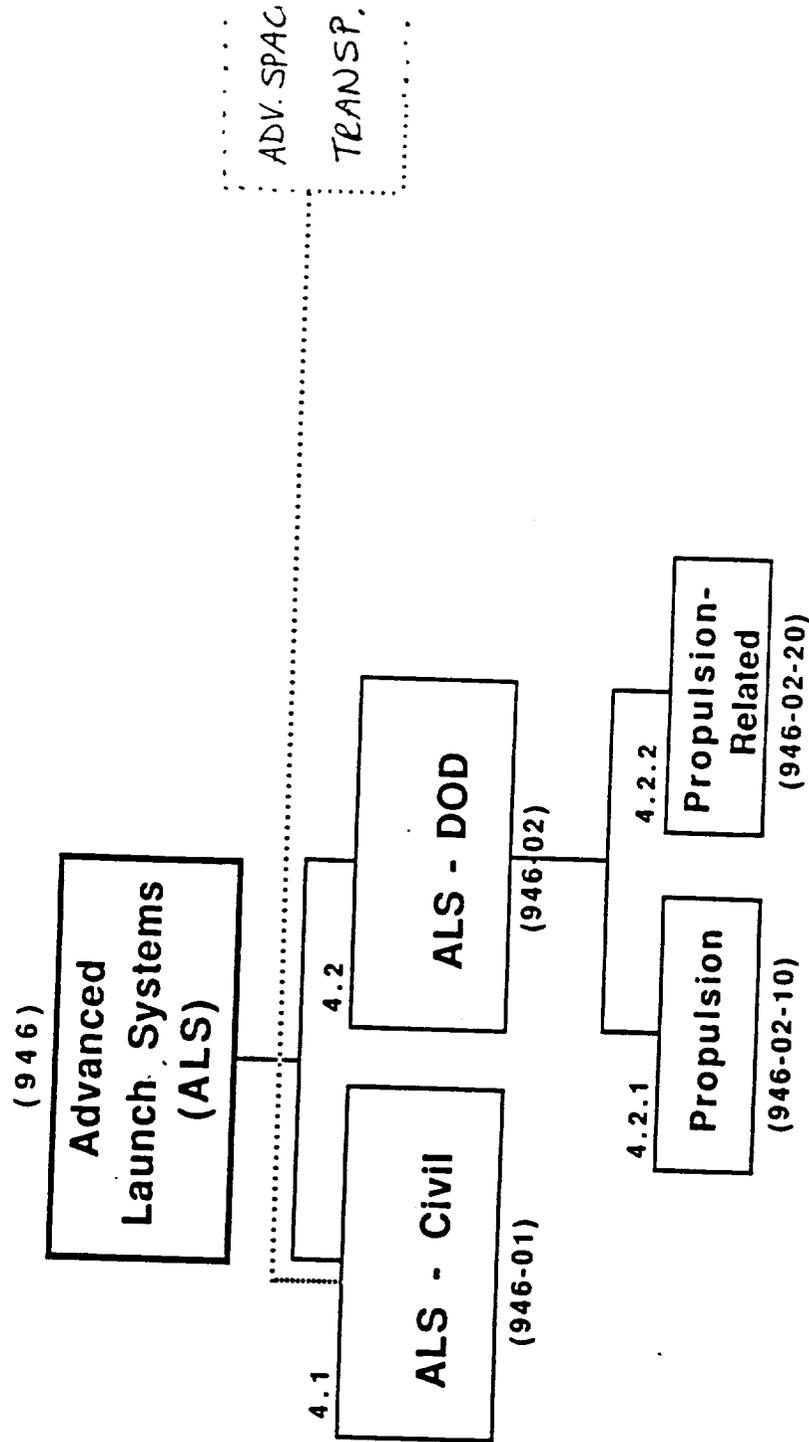
WORK BREAKDOWN STRUCTURE (WBS)

WITH UPN CODING SYSTEM

(906)



- FOR PHASE B HIGH VISIBILITY PROGRAMS AND SPECIAL STUDIES-USE 40'S/60'S/70'S SUB -BREAKS
- FOR CODE Z - USE 85 SUB-BREAK
- FOR PROGRAM SUPPORT/RESERVES - USE 99'S SUB-BREAKS 01 02 03 (6TH & 7TH DIGITS) TO DESIGNATE BRANCH



C-2

Appendix B
RTOP Form Help Screens Listing

MacRTOP General Overview

The ACCEPT Button on the CATALOG Form will write all information from all forms to the data file on the disk. If ACCEPT is used before entries have been made to all subsequent forms, empty fields will be seen in the RTOP

Enter all appropriate Task Resume (Form 1588) information before entering Resource and Funds (Form 1471b) information. Summary values entered into the collective Task Resumes will automatically be entered into Form 1471b (with the exception of Other Human Resources and In-House R&D Funds.)

Common Data Entry Commands:

Keyboard	Functional Description
ENTER Key	Enter Current Information into Database
TAB	Accept Data Entry in Current Field and Move to Next Field
Shift-TAB	Accept Data Entry in Current Field and Move Backward to Previous Field
RETURN Key	Same as TAB in Non-Text Record Field, New Line in Text Record Field
Shift-RETURN	Same as Shift-TAB in Non-Text Record Field
Command-(period)	Cancel Current Process (Printing, Data Entry, etc.)
Mouse	Move to Desired New Fields in Database

CATALOG FORM

1. TITLE - Enter the official title for the RTOP being described. Please stay within the space provided. Standard abbreviations may be used to stay within this field.
2. WBS Number - Select WBS from entries provided in the pop-up lists. New lists will be displayed according to possible entries in the previous selection.
3. UPN -Automatically filled in according to the WBS Number menu list selection. The NASA agency wide complete number code will be automatically entered according to the WBS Number selected: Unique Project Number (three digits), Subprogram (two digits) and RTOP Identification (two digits). Use the complete seven-digit code previously established for continuing RTOPs. For new RTOPs, use the Unique Project Number and Subprogram number codes provided in the individual Program Office call letter, or select these number codes from FMM 9100 (Financial Management Manual). RTOP Identification numbers (sixth and seventh digits) will be assigned by Headquarters, and normally will remain constant for the life of the RTOP.
4. CENTER - Select from the pop-up menu selection the NASA Installation responsible for the RTOP.
5. ADDRESS/MAIL STOP - Enter the address and mail stop of the NASA Installation responsible for the RTOP.
6. CITY, STATE, ZIP - Select from the pop-up menu selection the city, state and zip of the NASA Installation responsible for the RTOP.
7. POINT OF CONTACT - Identify one individual who has overall responsibility for the work.
8. PHONE - Identify the responsible individual's area code and phone number.
9. DATE OF RTOP - Enter the month, day and year (in that order) the document is prepared, expressing each as a two-digit number. Use dashes or slashes to enter the date. (e.g., 3/15/89).
10. CURRENT RTOP FY - Enter the Fiscal year for the current RTOP.
11. GUIDELINE - Select from the pop-up menu selection whether the RTOP is InGuideline or Over Guideline.
12. STATUS - Select from the pop-up menu selection the status of this RTOP .

OBJECTIVES - FORM 1471A

- * * Click on Form 1471a & 1588 to access this form. Double click on appropriate continuation or double click on a blank entry to edit Form 1471a.

13. **JUSTIFICATION** - This should include a concise statement of the problem or technical area to be pursued and answer the question of why the work is being proposed. It should identify the relationship of the proposed work to future missions, potential applications, and the way it differs and/or appears similar to other work within NASA, other Government agencies, or industry. This section also should identify other alternatives or options capable of solving the problem. If the work parallels other efforts, the rationale for this approach should be included.

14. **OBJECTIVES AND PLANS (Technical Objectives, Approach and Milestone Schedule)** - There should be a separate paragraph for each of these items.

- a. **TECHNICAL OBJECTIVES** - Describe the goals or accomplishments expected. Measurable statements are desired for all technical objectives.
- b. **APPROACH** - Outline the proposed approach to be taken in reaching the objective(s), including alternatives and options. Identify any specific Center facilities (e.g., 7 x 10 ft. wind tunnel) to be used in accomplishing this effort. Indicate major technical problems. When proprietary information is used, it must be clearly identified in the box provided in item 10 of sheet 1.

NOTE: THIS SECTION WILL BE UPDATED EACH FISCAL YEAR. Requirements for 'Objectives,' and 'Approach,' information may vary among Program Offices. When this occurs, additional guidance will be provided by the cognizant office.

15. **REVIEW AND REPORTING**

- a. Report progress of this RTOP as ongoing. Be explicit but concise.
- b. Indicate other formal reporting requirements (e.g., RTOP Progress, MICS) and frequency (e.g., monthly, quarterly, semiannually, annually) as specified by the NASA Program Office.
- c. **Institutional Environmental Impact Statement** - Provide a statement to indicate whether the work proposed under the RTOP:
 - (1) Is covered by an existing Environmental Impact Statement (EIS) or assessment (if so, which one); or
 - (2) Has insignificant environmental impact, or the basis for a referenced documented assessment which can be provided on request; or
 - (3) Is considered to have no environmental impact, in which case the statement to this effect in the RTOP will serve as documentation of the assessment; or
 - (4) Is the subject of a new or supplemental assessment, in which case a statement is required indicating the documentation of the assessment will be submitted when it becomes available. It may be included, if brief by amending the RTOP. Otherwise, it may be a separate statement.

Much of the work carried out under the RTOP may already be covered under the Institutional and Program EIS's as program or technology area assessments that are a matter of record. It is essential, however, that the environmental impact of each RTOP be considered by its proponent installation even though prior assessments have been documented.

6. **TASK TITLES** - The task titles created from double-clicking on a blank cell on the Resume section will be displayed and printed here.

RESOURCE AND FUNDS - FORM 1471B**IMPORTANT NOTE**

Several of the HUMAN RESOURCES and R&D FUNDS entries are automatically entered after the RESUME Form 1588 entries are entered for each individual task. The sum of all the task figures are calculated and entered in this form. All Prior Estimate figures are excluded.

16. RESOURCES REQUIREMENTS - This information must include data for a four-year period. ITEM 16 WILL BE UPDATED EACH FISCAL YEAR AND SHOULD PROVIDE THE BEST ESTIMATES OF R&D FUNDS AND HUMAN RESOURCES REQUIREMENTS.

I. HUMAN RESOURCES (WORKYEARS)

- A. NASA DIRECT CIVIL SERVICE** - Direct professional and direct support resources are enterable by the user and the totals are checked with the sum of 1588(b.) resume totals for the appropriate year. If the two totals are inconsistent the user is warned.

DIRECT PROFESSIONAL - Refers to scientists, engineers, and administrative professionals directly assigned to the RTOP.

DIRECT SUPPORT - Includes other professionals, technicians, clerks, mechanics, and other support allocated to, or in direct support of, the RTOP.

- B. OTHER** - Include military or civilian employees of other Government agencies assigned to the RTOP and any other non-NASA employees (e.g., NRC Fellows, Research Associates).

- C. CONTRACTOR SUPPORT WORKYEARS** - Entered automatically from Form 1588 S/C Manpower(c.) and represents contractor workyears for 'In-House Direct Program' only.

- II. R&D FUNDS (\$,K)** - Funds should be rounded to the nearest thousand dollars and entered without the three final zeros (e.g., enter \$49,750 as \$50).

- A. OUT-OF-HOUSE (DIRECT PROGRAM)** - Automatically calculated from Form 1588 R/D Funding Total(f.) minus II.B entry. This portion of the R&D program is implemented through the use of end-item contracts and grants, i.e., the effort results in delivered products, either paper or hardware. This portion of the program is clearly programmatic in nature, and the requirements are identifiable to the benefiting program.

- B. IN-HOUSE** - This portion of the program is performed on- or near-site and encompasses purchased goods and services brought in-house to support R&D activities. II.B is the sum of II.B.(1), (2) & (3).

(1) **DIRECT PROGRAM** - Enterable by user.

(2) **DIRECT PROGRAM SUPPORT** - Enterable by user.

(3) **MULTIPROGRAM SUPPORT** - Automatically entered from Form 1588 IMS Funding(d.) and includes support activities of a general nature which are not readily amenable to user charges. Costs are allocated to specific programs by charging each RTOP a proportionate share, based on NASA Direct Civil Service workyears. This portion of the In-House costs is calculated by multiplying the RTOP Direct Civil Service workyears by the approved Center-wide rate per workyear of effort. Approved Ctr.-wide Rate/Workyear of Effort(WYE) is the IMS of this RTOP entered from the IMS Rate menu selection in Form 1588.

TOTAL R&D FUNDS - This is the sum of A. Out-of-House and B. In-House

- III. CONTRACTS** - List contract number, name of contractor and dollar amounts for 'Out-of-House' and 'In-House Direct Program' contracts. For 'In-House Direct Program' contracts, also indicate the workyears of effort for the current fiscal year (i.e., the fiscal year for which the RTOP is being written).

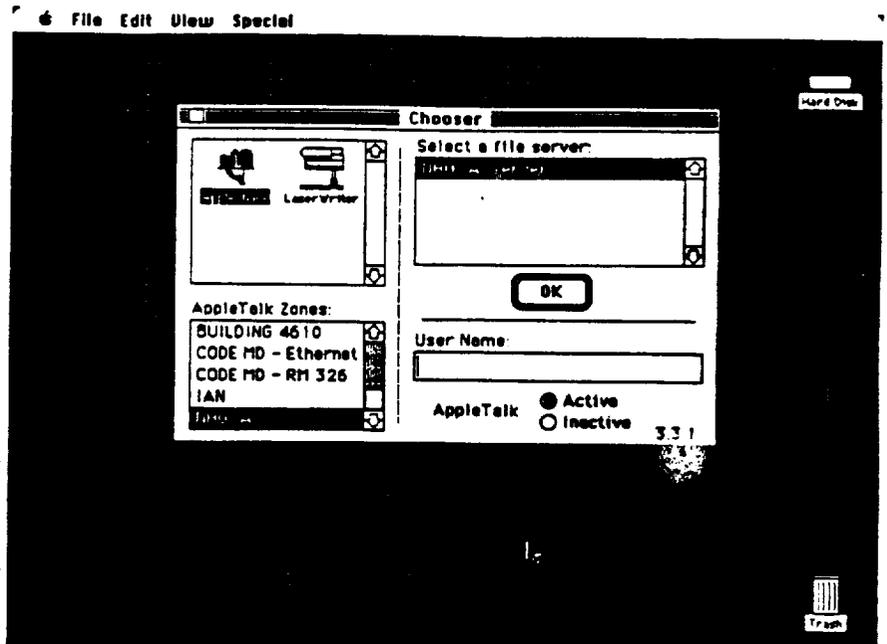
Appendix C
AlisaShare File Access

Fileserver Access Procedures

Introductory Screen

- **Apple Menu**
Pull down - select Chooser.
- Click **Apple Share**.
- Click **NHQVAX**.
- Click **NHQVAXServer**.
- Click **"OK"**.

This will automatically bring up the User Information Screen.



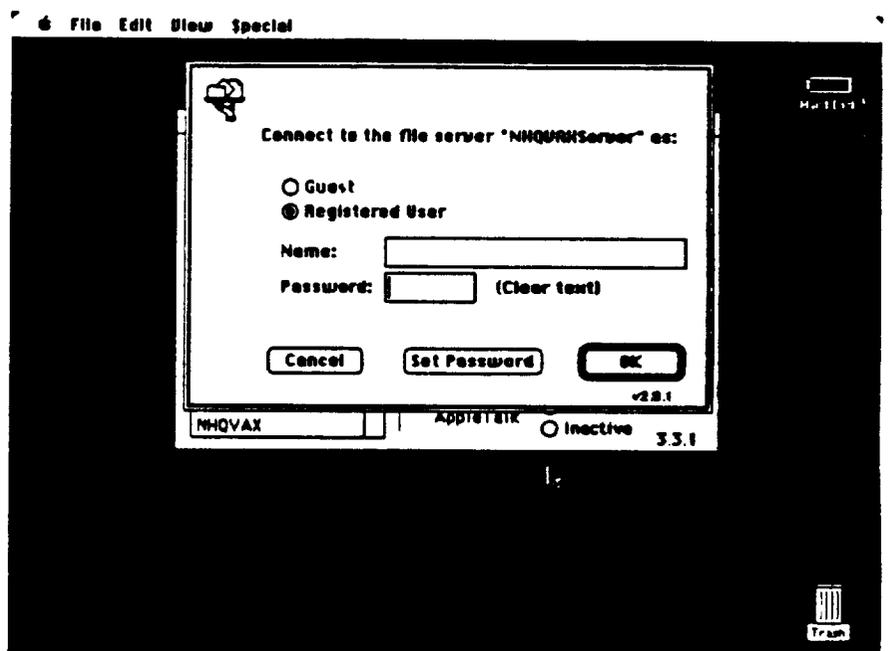
User Information Screen

- Enter name and password as indicated on the VAX Password sheet

Your password will be shown on Screen as Dots, to ensure Password Privacy.

- Click **"OK"**.

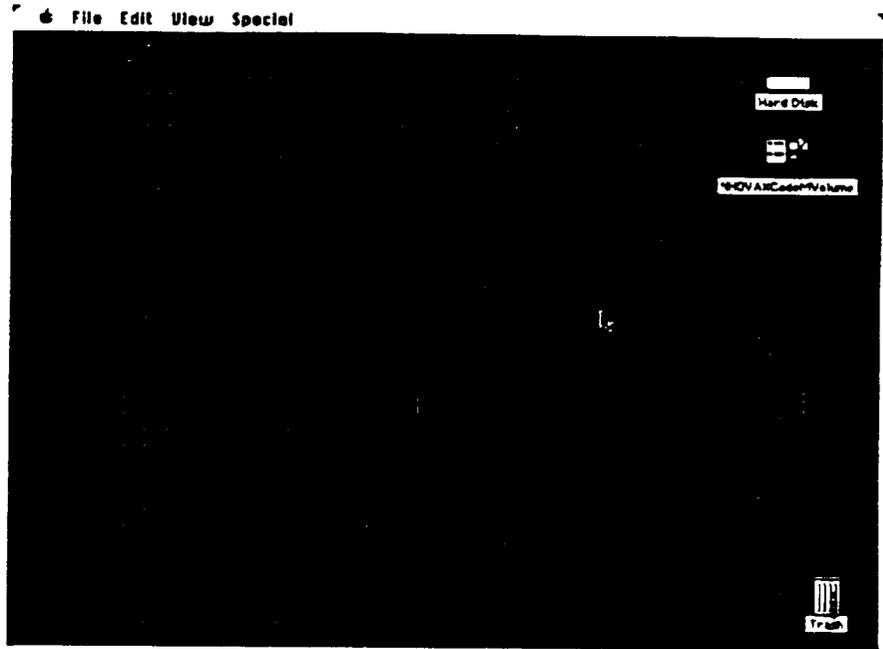
This will automatically bring up the Volume Screen.



Desktop

After entering the Volume Password, the Desktop will show the "NHQVAXCodeMVolume" Icon.

Open it to use the VAX as a Shared Network Volume. (Copy files from it, Post files to it, etc.)

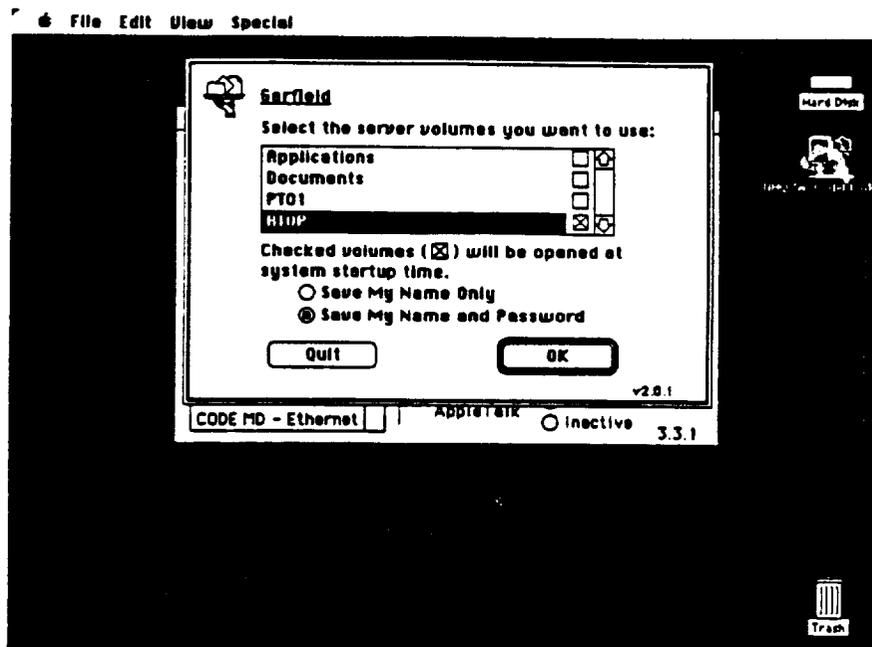


ORIGINAL
OF POOR QUALITY

Volume Screen

- Click on RTOP.
- Click the box to the right of RTOP.
- You will then see choices for saving your name or name and password. We suggest saving name and password to allow for automatic logon to the volume when your Mac is booted.
- Click "OK".

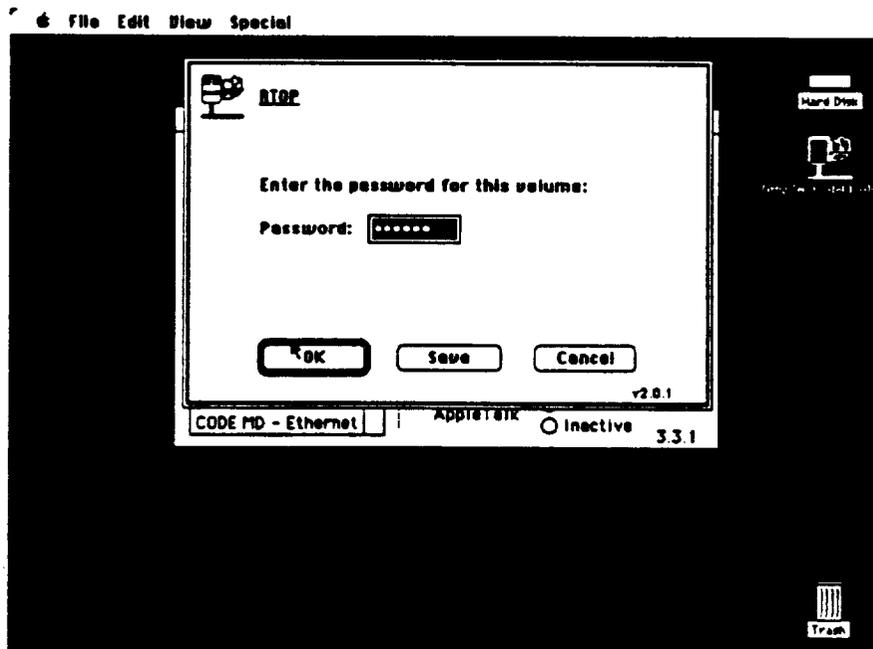
This will automatically bring up the Volume Password Screen.



Volume Password Screen

- Enter the Password for the Volume and Click "OK".
- The Password is LAUNCH (All CAPS).
- Click Save, to Save this password, to allow auto logon.
- Click "OK".

This will automatically bring up Your Desktop.



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OF POOR QUALITY

Appendix D
Quick Reference NASAMail Logon

QUICK REFERENCE NASAMAIL LOGON (Using Smartcom II)

Provided in the NASAMAIL Network folder is a copy of Smartcom II Application, Smartcom II Help document, Stuffit Application, and the NASAMAIL Smartcom document. Follow the procedures outlined below for logon to the NASAMAIL system.

A) Double click on the NASAMAIL Smartcom II document. You will immediately see the following screen and the the modem will begin dialing the Network connect number. This auto startup document is designed for users who are local to NASA Headquarters. *If you are trying to access the network from a long distance number, click on the CANCEL button in the lower left corner of the screen.*

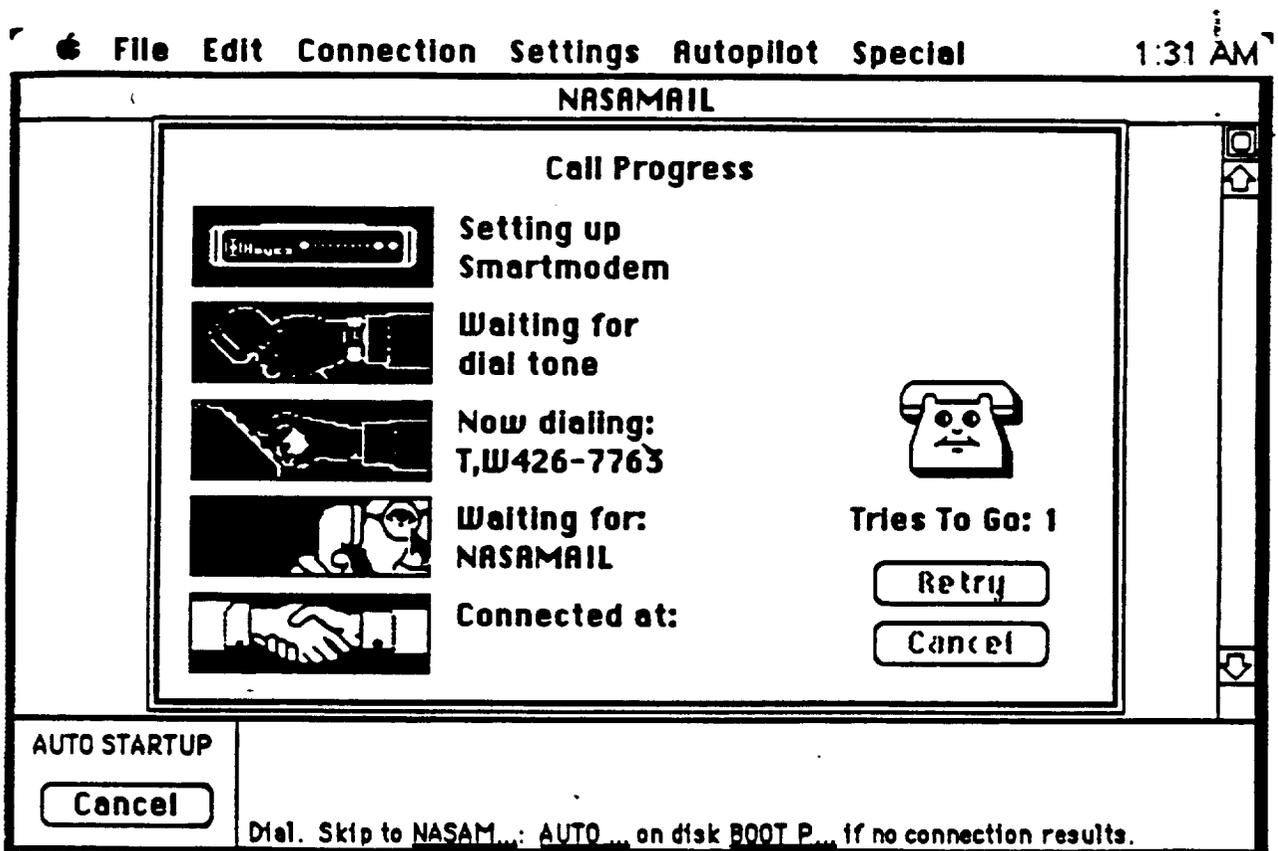


Figure 1

○ As your call progresses through each phase, the status icons will turn black (Figure 1). When the connection is made you will here a high pitch tone followed by static, and the screen will go blank as in Figure 2. At this point you are connected to the NASA Packet Switching Network. Hit the Carriage Return 2 or 3 time to get the following screen.

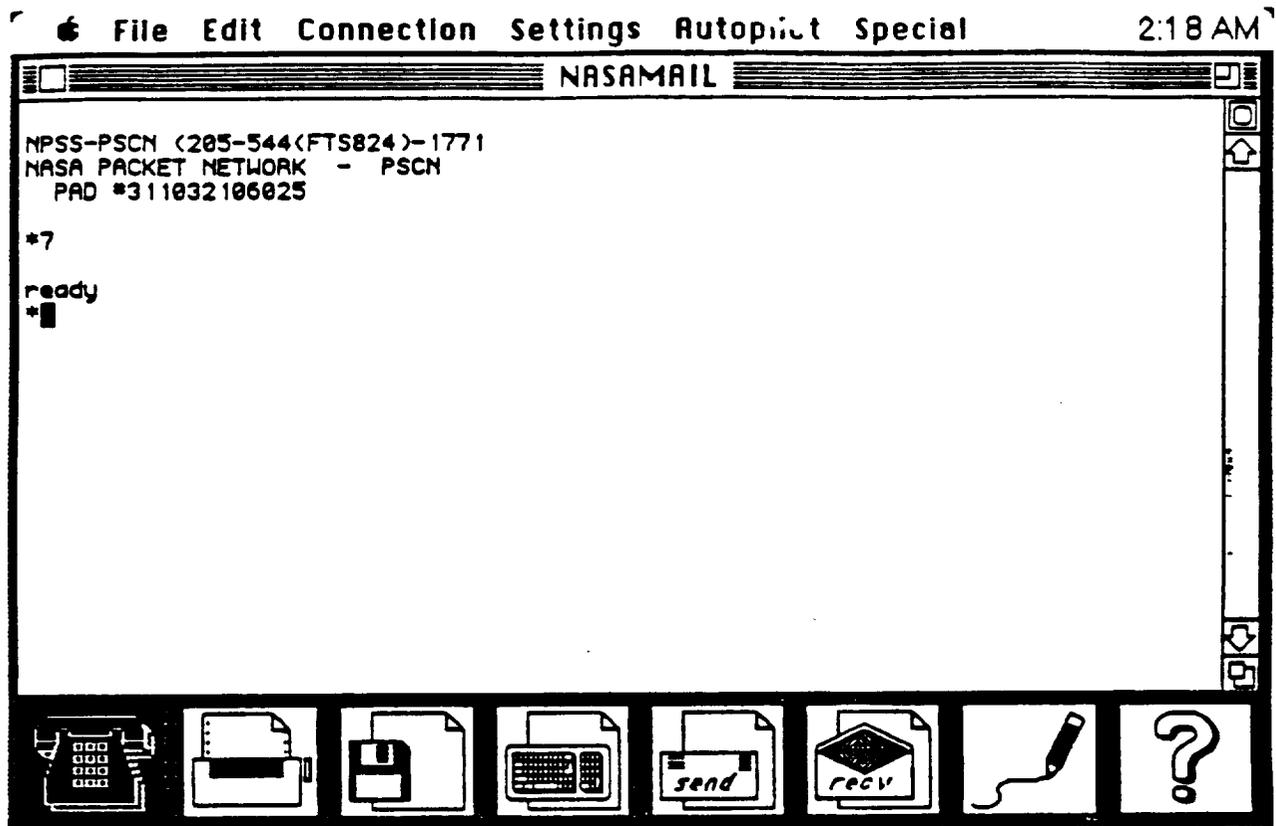


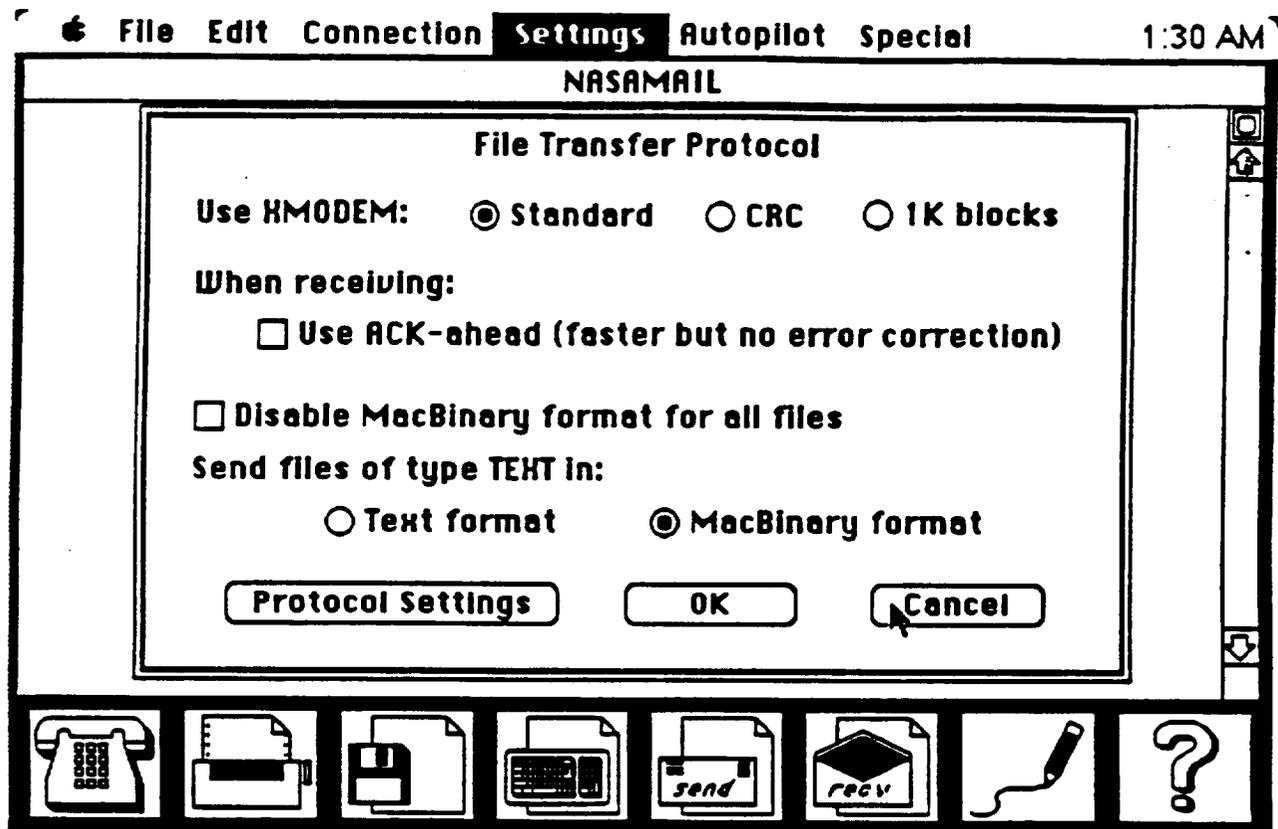
Figure 3

At this point you can follow the standard logon procedures listed in your NASAMAIL users guide. For added convenience, you can set-up an auto logon procedure which I have included in this document.

1. Pull down the Autopilot menu at the top and select OPEN.
2. Select OP-L Logon
3. The following screen will appear (Figure 4). For each Autotype line highlight by clicking on the line and then hit change and change the instructions as indicated. Make sure you leave the Carriage Return. When you are all through, close (save) and you will return to the blank screen. *Hit Option L to begin the auto logon sequence.*

STANDARD FORMAT FOR SENDING BINARY FILES

There is only one rule to remember, make sure that the File Transfer Protocol Settings are as shown below, and then follow the procedure outlined in the NASAMAIL User Guide for use of the upload binary command for sending files and/or the download binary command for receiving files.



Appendix E
4th Dimension Runtime™
VERSION 2.0

4D Runtime

4D Runtime™ allows you to use 4th DIMENSION® databases that have a custom menu system. With 4D Runtime you can use a database exactly the same way you would with the Runtime environment of 4th DIMENSION.

Registering 4D Runtime

IMPORTANT! Fill out the Registration card and send it to ACIUS. You must fill out and send the registration card in order to receive update notices and other information about 4D Runtime.

System Requirements

4D Runtime requires the following in order to run:

- A Macintosh computer with 1 megabyte (MB) or more of memory
- A hard disk
- System 6.0.3 or later
- Finder 6.1 or later

Optimizing Performance

In general, allocating more memory (RAM) to 4D Runtime will improve performance. The following recommendations will help result in the best performance.

- Turn off the RAM Cache in the Control Panel.
- If running under MultiFinder, allocate as much memory as you can to 4D Runtime.

Installing 4D Runtime

This section describes how to install 4D Runtime version 2.0 and 4D Tools™ on your hard disk. The programs are shipped in a compressed format and must be decompressed before being used.

To install 4D Runtime and 4D Tools on your hard disk:

1. Create a new folder called 4D Runtime on your hard disk.
2. Insert the 4D Runtime disk into any drive.
3. Copy the file called 4D Runtime.sit from the 4D Runtime disk into the 4D Runtime folder.

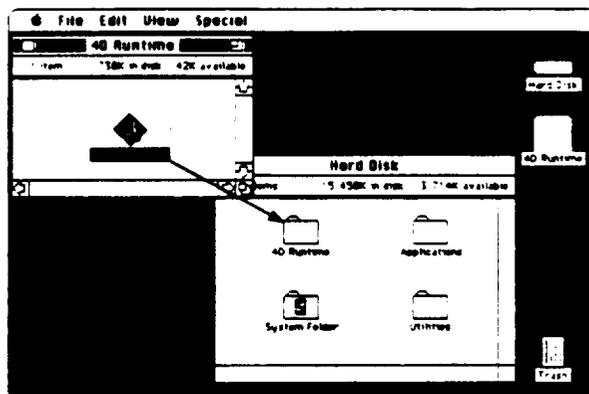


Figure 1
Copy 4D Runtime.sit into the 4D Runtime folder

4. Eject the 4D Runtime disk.
5. Store the 4D Runtime disk in a safe place.

The next step will “extract” the 4D Runtime and 4D Tools programs from the file called 4D Runtime.sit. You need about 900K of space available on your hard disk to install the files.

6. To extract the 4D Runtime and 4D Tools programs, double-click the file called 4D Runtime.sit.

Double-clicking the file begins a decompression process that extracts the two files.

7. Delete the 4D Runtime.sit file from your hard disk.

Configuring 4D Runtime for Multi-user

To configure 4D Runtime for multi-user, hold down the mouse button while the program is starting. The dialog box shown in Figure 4 is displayed.

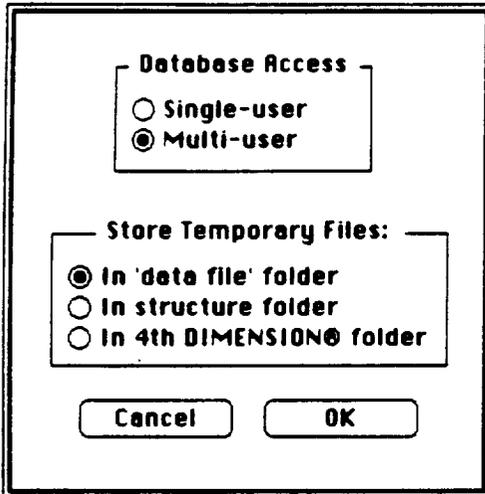


Figure 4
Multi-user dialog box

Click the Multi-user button. 4D Runtime remembers this setting and you will not need to reconfigure unless you want to switch to single-user mode.

Specifying the Location of Temporary Files

While 4D Runtime is running it sometimes creates temporary files. These files are deleted when you quit 4D Runtime. The dialog box shown in Figure 4 allows you to specify the location of these files in order to optimize performance.

In all cases it is best to locate these files on your local hard disk. In single-user mode, the default setting of "In the 'data file' folder" is usually best. In multi-user mode and if the structure is on the local hard disk, the "In the structure folder" setting is usually best. In multi-user mode and if the structure is on the file server, the "In 4th DIMENSION folder" setting is usually optimal.

4D Tools

The 4D Tools utility for 4th DIMENSION is used to analyze and repair damage to a database, and to compact database files.

To use 4D Tools:

1. Start 4D Tools from the Finder.
2. An open-file dialog box is displayed. Select the database on which you want to run 4D Tools.
3. Select one of the options described below.

Checking and Recovering Database Files

You choose the Check & Recover menu item to analyze and repair damage in database files. 4D Tools displays the dialog box in Figure 5.

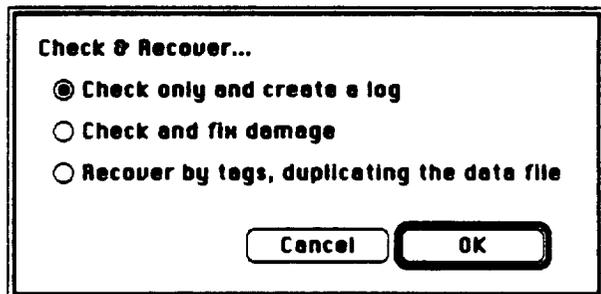


Figure 5
Dialog box displayed by Check & Recover